Department of Design and Construction

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS
VOLUME 1 – BID BOOKLET

SINGLE PLA CONTRACT VERSION

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Introduction

This Bid Booklet is intended to provide general information necessary for bidding on a DDC public works project and is part of the Contract Documents, as per Article 1.1 of the Standard Construction Contract.

As this contract is solicited via the PASSPort system, the bidder will be required to complete all of the PASSPort forms and questionnaires. These forms and questionnaires, along with the bidder's responses, will become part of the Bid Booklet.

Additional information on the PASSPort system can be found at the following website:
https://www1.nyc.gov/site/mocs/systems/passport-user-materials.page

Bid Submission Requirements

THE FOLLOWING MUST BE COMPLETED AND SUBMITTED FOR THE BID TO BE CONSIDERED RESPONSIVE:

1. Completed electronic bid submission in PASSPort;
    a. All required fields in PASSPort must be completed.
2. Bid security, if required.
    a. If Bid security is in a form of a bid bond, bidders must include it with their electronic PASSPort submission.
    b. If Bid security is in a form of a certified check, bidders must hand deliver the certified check.

BIDDERS ARE ADVISED THAT PAPER BID SUBMISSIONS WILL BE DEEMED NON-RESPONSIVE. BIDDERS MUST SUBMIT THEIR BIDS ELECTRONICALLY IN PASSPORT AND PROVIDE THE BID SECURITY FOR THE BID TO BE CONSIDERED RESPONSIVE.

THE FOLLOWING MAY RESULT IN THE BID BEING FOUND NON-RESPONSIVE:

1. Failure to upload required files or documents as part of a mandatory PASSPort Questionnaire response.
2. Uploading an incorrect file as part of a mandatory PASSPort Questionnaire response.

Notices to Bidders

Project Labor Agreement & Single Contract

PROJECT LABOR AGREEMENT: This contract is subject to a Project Labor Agreement ("PLA") entered into between the City and the Building and Construction Trades Council of Greater New York ("BCTC") affiliated Local Unions. By submitting a bid, the Contractor agrees that the PLA is binding on the Contractor and all subcontractors of all tiers. The bidder to be awarded the contract will be required to execute a "Letter of Assent" prior to award.

The Bidder is advised to review the following: (1) Notice regarding the PLA, (2) the PLA, and (3) the Letter of Assent, all of which are set forth at the beginning of Volume 2 of the Contract Documents.

SINGLE CONTRACT: As stated above, this contract is subject to a PLA. The requirements of the Wicks Law for separate prime contractors DO NOT APPLY to any project that is covered by a PLA. Accordingly, the requirements of the Wicks Law for separate prime contractors do not apply to this Project. The Project consists of a single contract.

The Bidder is advised to review the Notice set forth at the beginning of Volume 2 of the Contract Documents. The Notice specifies revisions to the Contract Documents to provide that the Project consists of a single contract and to delete any and all references to separate prime contractors.

Pre Bid Questions (PBQs)

Please be advised that PBQs must be submitted to the Agency Contact Person via PASSPort (in the RFx Discussions with buyer section) within the timeframe indicated in the PASSPort procurement.

NYC Contract Financing Loan Fund

If your business is working as a prime or subcontractor on a project with a City agency or City-funded entity, you may be eligible for a Contract Financing Loan from a participating lender coordinated with the NYC Department of Small Business Services (SBS). Loan repayment terms align with the contract payment schedule.

For more information: Call 311 or visit https://www1.nyc.gov/nycbusiness/article/contract-financing-loan-fund

M/WBE Notice to Prospective Contractors

PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED BUSINESS ENTERPRISES IN CITY PROCUREMENT (9/2020 version)

ARTICLE I. M/WBE PROGRAM

Section 6-129 of the Administrative Code of the City of New York ("Section 6-129") establishes the program for participation in City procurement ("M/WBE Program") by minority-owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs"), certified in accordance with Section 1304 of the New York City Charter. As stated in Section 6-129, the intent of the program is to address the impact of discrimination on the City's procurement process, and to promote the public interest in avoiding fraud and favoritism in the procurement process, increasing competition for City business, and lowering contract costs. The contract provisions contained herein are pursuant to Section 6-129, and the rules of the Department of Small Business Services ("DSBS") promulgated thereunder.

If this Contract is subject to the M/WBE Program established by Section 6-129, the specific requirements of MBE and/or WBE participation for this Contract are set forth in Schedule B of the Contract (entitled the "M/WBE Utilization Plan") and are detailed below. Contracts solicited through the Procurement and Sourcing Solutions Portal (PASSPort) will contain a Schedule B in the format outlined in the Schedule B – M/WBE Utilization Plan & PASSPort rider. The provisions of this notice will apply to contracts subject to the M/WBE Program established by Section 6-129 regardless of solicitation source.

The Contractor must comply with all applicable MBE and WBE requirements for this Contract.

All provisions of Section 6-129 are hereby incorporated in the Contract by reference and all terms used herein that are not defined herein shall have the meanings given such terms in Section 6-129.

References to MBEs or WBEs shall also include such businesses certified pursuant to the executive law where credit is required by section 311 of the New York City Charter or other provision of law.

Article I, Part A, below, sets forth provisions related to the participation goals for construction, standard and professional services contracts.

Article I, Part B, below, sets forth miscellaneous provisions related to the M/WBE Program.

PART A

PARTICIPATION GOALS FOR CONSTRUCTION, STANDARD

AND PROFESSIONAL SERVICES CONTRACTS OR TASK ORDERS

1. The **MBE and/or WBE Participation Goals** established for this Contract or Task Orders issued pursuant to this Contract, ("**Participation Goals**"), as applicable, are set forth on Schedule B, Part 1 to this Contract (see Page 1, Line 1 Total Participation Goals) or will be set forth on Schedule B, Part 1 to Task Orders issued pursuant to this Contract, as applicable.

The **Participation Goals** represent a percentage of the total dollar value of the Contract or Task Order, as applicable, that may be achieved by awarding subcontracts to firms certified with DSBS as MBEs and/or WBEs, and/or by crediting the participation of prime contractors and/or qualified joint ventures as provided in Section 3 below, unless the goals have been waived or modified by Agency in accordance with Section 6-129 and Part A, Sections 10 and 11 below, respectively.

2. If **Participation Goals** have been established for this Contract or Task Orders issued pursuant to this Contract, Contractor agrees or shall agree as a material term of the Contract that Contractor shall be subject to the **Participation Goals**, unless the goals are waived or modified by Agency in accordance with Section 6-129 and Part A, Sections 10 and 11 below, respectively.

3. If **Participation Goals** have been established for this Contract or Task Order issued pursuant to this Contract, a Contractor that is an MBE and/or WBE shall be permitted to count its own participation toward fulfillment of the relevant **Participation Goal**, provided that in accordance with Section 6-129 the value of Contractor's participation shall be determined by subtracting from the total value of the Contract or Task Order, as applicable, any amounts that the Contractor pays to direct subcontractors (as defined in Section 6-129(c)(13)), and provided further that a Contractor that is certified as both an MBE and a WBE may count its own participation either toward the goal for MBEs or the goal for WBEs, but not both.

A Contractor that is a qualified joint venture (as defined in Section 6-129(c)(30)) shall be permitted to count a percentage of its own participation toward fulfillment of the relevant **Participation Goal**. In accordance with Section 6-129, the value of Contractor's participation shall be determined by subtracting from the total value of the Contract or Task Order, as applicable, any amounts that Contractor pays to direct subcontractors, and then multiplying the remainder by the percentage to be applied to total profit to determine the amount to which an MBE or WBE is entitled pursuant to the joint venture agreement, provided that where a participant in a joint venture is certified as both an MBE and a WBE, such amount shall be counted either toward the goal for MBEs or the goal for WBEs, but not both.

4. A. If **Participation Goals** have been established for this Contract, a prospective contractor shall be required to submit with its bid or proposal, as applicable, a completed Schedule B, M/WBE Utilization Plan, Part 2 (see Pages1-2) indicating: (a) whether the contractor is an MBE or WBE, or qualified joint venture; (b) the percentage of work it intends to award to direct subcontractors; (c) in cases where the contractor intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end; as well as the name, addresses, and telephone numbers of the M/WBE subcontractors if required by the solicitation; and (d) the prospective contractor's required certification and affirmations. In the event that this M/WBE Utilization Plan indicates that the bidder or proposer, as applicable, does not intend to meet the **Participation Goals**, the bid or proposal, as applicable, shall be deemed non-responsive, unless Agency has granted the bidder or proposer, as applicable, a pre-award waiver of the **Participation Goals** in accordance with Section 6-129 and Part A, Section 10 below.

B. (i) If this Contract is for a master services agreement or other requirements type contract that will result in the issuance of Task Orders that will be individually registered ("Master Services Agreement") and is subject to M/WBE **Participation Goals**, a prospective contractor shall be required to submit with its bid or proposal, as applicable, a completed Schedule B, M/WBE Participation Requirements for Master Services Agreements That Will Require Individually Registered Task Orders, Part 2 (page 2) indicating the prospective contractor's certification and required affirmations to make all reasonable good faith efforts to meet participation goals established on each individual Task Order issued pursuant to this Contract, or if a partial waiver is obtained or such goals are modified by the Agency, to meet the modified **Participation Goals** by soliciting and obtaining the participation of certified MBE and/or WBE firms. In the event that the Schedule B indicates that the bidder or proposer, as applicable, does not intend to meet the **Participation Goals** that may be established on Task Orders issued pursuant to this Contract, the bid or proposal, as applicable, shall be deemed non-responsive.

(ii) **Participation Goals** on a Master Services Agreement will be established for individual Task Orders issued after the Master Services Agreement is awarded. If **Participation Goals** have been established on a Task Order, a contractor shall be required to submit a Schedule B – M/WBE Utilization Plan For Independently Registered Task Orders That Are Issued Pursuant to Master Services Agreements, Part 2 (see Pages 1-2) indicating: (a) whether the contractor is an MBE or WBE, or qualified joint venture; (b) the percentage of work it intends to award to direct subcontractors; (c) in cases where the contractor intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end; as well as the name, addresses, and telephone numbers of the M/WBE subcontractors if required by the solicitation; and (d) the prospective contractor's required certification and affirmations. The contractor must engage in good faith efforts to meet the **Participation Goals** as established for the Task Order unless Agency has granted the contractor a pre-award waiver of the **Participation Goals** in accordance with Section 6-129 and Part A, Section 10 below.

C. THE BIDDER/PROPOSER MUST COMPLETE THE SCHEDULE B INCLUDED HEREIN (SCHEDULE B, PART 2). A SCHEDULE B SUBMITTED BY THE BIDDER/PROPOSER WHICH DOES NOT INCLUDE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS WILL BE DEEMED TO BE NON-RESPONSIVE, UNLESS A FULL WAIVER OF THE PARTICIPATION GOALS IS GRANTED (SCHEDULE B, PART 3). IN THE EVENT THAT THE CITY DETERMINES THAT THE BIDDER/PROPOSER HAS SUBMITTED A SCHEDULE B WHERE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS ARE COMPLETED BUT OTHER ASPECTS OF THE SCHEDULE B ARE NOT COMPLETE, OR CONTAIN A COPY OR COMPUTATION ERROR THAT IS AT ODDS WITH THE VENDOR CERTIFICATION AND AFFIRMATIONS, THE BIDDER/PROPOSER WILL BE NOTIFIED BY THE AGENCY AND WILL BE GIVEN FOUR (4) CALENDAR DAYS FROM RECEIPT OF NOTIFICATION TO CURE THE SPECIFIED DEFICIENCIES AND RETURN A COMPLETED SCHEDULE B TO THE AGENCY. FAILURE TO DO SO WILL RESULT IN A DETERMINATION THAT THE BID/PROPOSAL IS NON-RESPONSIVE. RECEIPT OF NOTIFICATION IS DEFINED AS THE DATE NOTICE IS E-MAILED OR FAXED (IF THE BIDDER/PROPOSER HAS PROVIDED AN E-MAIL ADDRESS OR FAX NUMBER), OR NO LATER THAN FIVE (5) CALENDAR DAYS FROM THE DATE OF MAILING OR UPON DELIVERY, IF DELIVERED.

5. Where an **M/WBE** Utilization Plan has been submitted, the Contractor shall, within 30 days of issuance by Agency of a notice to proceed, submit a list of proposed persons or entities to which it intends to award subcontracts within the subsequent 12 months. In the case of multi-year contracts, such list shall also be submitted every year thereafter. The Agency may also require the Contractor to report periodically about the contracts awarded by its direct subcontractors to indirect subcontractors (as defined in Section 6-129(c)(22)). **PLEASE NOTE: If this Contract is a public works project subject to GML §101(5) (i.e., a contract valued at or below $3M for projects in New York City) or if the Contract is subject to a project labor agreement in accordance with Labor Law §222, and the bidder is required to identify at the time of bid submission its intended subcontractors for the Wicks trades (plumbing and gas fitting; steam heating, hot water heating, ventilating and air conditioning (HVAC); and electric wiring), the Contractor must identify all those to which it intends to award construction subcontracts for any portion of the Wicks trade work at the time of bid submission, regardless of what point in the life of the contract such subcontracts will occur. In identifying intended subcontractors in the bid submission, bidders may satisfy any Participation Goals established for this Contract by proposing one or more subcontractors that are MBEs and/or WBEs for any portion of the Wicks trade work.** In the event that the Contractor's selection of a subcontractor is disapproved, the Contractor shall have a reasonable time to propose alternate subcontractors.

6. MBE and WBE firms must be certified by DSBS in order for the Contractor to credit such firms' participation toward the attainment of the **Participation Goals**. Such certification must occur prior to the

firms' commencement of work. A list of city-certified MBE and WBE firms may be obtained from the DSBS website at www.nyc.gov/buycertified, by emailing DSBS at buyer@sbs.nyc.gov, by calling (212) 513-6451, or by visiting or writing DSBS at One Liberty Plaza, New York, New York, 10006, 11th floor. Eligible firms that have not yet been certified may contact DSBS in order to seek certification by visiting www.nyc.gov/getcertified, emailing MWBE@sbs.nyc.gov, or calling the DSBS certification helpline at (212) 513-6311. A firm that is certified as both an MBE and a WBE may be counted either toward the goal for MBEs or the goal for WBEs, but not both. No credit shall be given for participation by a graduate MBE or graduate WBE, as defined in Section 6-129(c)(20).

7. Where an **M/WBE** Utilization Plan has been submitted, the Contractor shall, with each voucher for payment, and/or periodically as Agency may require, submit statements, certified under penalty of perjury, which shall include, but not be limited to,: the total amount the Contractor paid to its direct subcontractors, and, where applicable pursuant to Section 6-129(j), the total amount direct subcontractors paid to indirect subcontractors; the names, addresses and contact numbers of each MBE or WBE hired as a subcontractor by the Contractor, and, where applicable, hired by any of the Contractor's direct subcontractors; and the dates and amounts paid to each MBE or WBE. The Contractor shall also submit, along with its voucher for final payment: the total amount it paid to subcontractors, and, where applicable pursuant to Section 6-129(j), the total amount its direct subcontractors paid directly to their indirect subcontractors; and a final list, certified under penalty of perjury, which shall include the name, address and contact information of each subcontractor that is an MBE or WBE, the work performed by, and the dates and amounts paid to each.

8. If payments made to, or work performed by, MBEs or WBEs are less than the amount specified in the Contractor's **M/WBE** Utilization Plan, Agency shall take appropriate action, in accordance with Section 6-129 and Article II below, unless the Contractor has obtained a modification of its **M/WBE** Utilization Plan in accordance with Section 6-129 and Part A, Section 11 below.

9. Where an **M/WBE** Utilization Plan has been submitted, and the Contractor requests a change order the value of which exceeds the greater of 10 percent of the Contract or Task Order, as applicable, or $500,000, Agency shall review the scope of work for the Contract or Task Order, as applicable, and the scale and types of work involved in the change order, and determine whether the **Participation Goals** should be modified.

10. Pre-award waiver of **the Participation Goals**.

(a) A bidder or proposer, or contractor with respect to a Task Order, may seek a pre-award full or partial waiver of the Participation Goals in accordance with Section 6-129, which requests that Agency change one or more **Participation Goals** on the grounds that the **Participation Goals** are unreasonable in light of the availability of certified firms to perform the services required, or by demonstrating that it has legitimate business reasons for proposing a lower level of subcontracting in its M/WBE Utilization Plan.

(b) To apply for a full or partial waiver of the **Participation Goals**, a bidder, proposer, or contractor, as applicable, must complete Part 3 of Schedule B **and submit such request no later than seven (7) calendar days prior to the date and time the bids, proposals, or Task Orders are due, in writing to the Agency by email at MWBEModification@ddc.nyc.gov. Full or partial waiver requests that are received later than seven (7) calendar days prior to the date and time the bids, proposals, or Task Orders are due may be rejected as untimely**. Bidders, proposers, or contractors, as applicable, who have submitted timely requests will receive an Agency response by no later than two (2) calendar days prior to the due date for bids, proposals, or Task Orders; provided, however, that if that date would fall on a weekend or holiday, an

Agency response will be provided by close-of-business on the business day before such weekend or holiday date.

(c) If the Agency determines that the **Participation Goals** are unreasonable in light of the availability of certified firms to perform the services required, it shall revise the solicitation and extend the deadline for bids and proposals, or revise the Task Order, as applicable.

(d) Agency may grant a full or partial waiver of the **Participation Goals** to a bidder, proposer or contractor, as applicable, who demonstrates—before submission of the bid, proposal or Task Order, as applicable—that it has legitimate business reasons for proposing the level of

subcontracting in its **M/WBE** Utilization Plan. In making its determination, Agency shall consider factors that shall include, but not be limited to, whether the bidder, proposer or contractor, as applicable, has the capacity and the bona fide intention to perform the Contract without any subcontracting, or to perform the Contract without awarding the amount of subcontracts represented by the **Participation Goals**. In making such determination, Agency may consider whether the **M/WBE** Utilization Plan is consistent with past subcontracting practices of the bidder, proposer or contractor, as applicable, whether the bidder, proposer or contractor, as applicable, has made efforts to form a joint venture with a certified firm, and whether the bidder, proposer, or contractor, as applicable, has made good faith efforts to identify other portions of the Contract that it intends to subcontract.

11. Modification of **M/WBE** Utilization Plan. (a) A Contractor may request a modification of its **M/WBE** Utilization Plan after award of this Contract. **PLEASE NOTE: If this Contract is a public works project subject to GML §101(5) (i.e., a contract valued at or below $3M for projects in New York City) or if the Contract is subject to a project labor agreement in accordance with Labor Law §222, and the bidder is required to identify at the time of bid submission its intended subcontractors for the Wicks trades (plumbing and gas fitting; steam heating, hot water heating, ventilating and air conditioning (HVAC); and electric wiring), the Contractor may request a Modification of its M/WBE Utilization Plan as part of its bid submission.** The Agency may grant a request for Modification of a Contractor's **M/WBE** Utilization Plan if it determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts to meet the **Participation Goals**. In making such determination, Agency shall consider evidence of the following efforts, as applicable, along with any other relevant factors:

(i) The Contractor advertised opportunities to participate in the Contract, where appropriate, in general circulation media, trade and professional association publications and small business media, and publications of minority and women's business organizations;

(ii) The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;

(iii) The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs or WBEs that their interest in the Contract was solicited;

(iv) The Contractor made efforts to identify portions of the work that could be substituted for portions originally designated for participation by MBEs and/or WBEs in the **M/WBE** Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;

(v) The Contractor held meetings with MBEs and/or WBEs prior to the date their bids or proposals were due, for the purpose of explaining in detail the scope and requirements of the work for which their bids or proposals were solicited;

(vi) The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts, or act as suppliers or service providers;

(vii) Timely written requests for assistance made by the Contractor to Agency's M/WBE liaison officer and to DSBS;

(viii) Description of how recommendations made by DSBS and Agency were acted upon and an explanation of why action upon such recommendations did not lead to the desired level of participation of MBEs and/or WBEs.

Agency's M/WBE officer shall provide written notice to the Contractor of the determination.

(b) The Agency may modify the **Participation Goals** when the scope of the work has been changed by the Agency in a manner that affects the scale and types of work that the Contractor indicated in its **M/WBE Utilization Plan** would be awarded to subcontractors.

12. If the Contractor was required to identify in its bid or proposal the MBEs and/or WBEs they intended to use in connection with the performance of the Contract or Task Order, substitutions to the identified firms may only be made with the approval of the Agency, which shall only be given when the Contractor has proposed to use a firm that would satisfy the **Participation Goals** to the same extent as the firm previously identified, unless the Agency determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts. In making such determination, the Agency shall require evidence of the efforts listed in Section 11(a) above, as applicable, along with any other relevant factors.

13. If this Contract is for an indefinite quantity of construction, standard or professional services or is a requirements type contract and the Contractor has submitted an **M/WBE** Utilization Plan and has committed to subcontract work to MBEs and/or WBEs in order to meet the **Participation Goals**, the Contractor will not be deemed in violation of the M/WBE Program requirements for this Contract with regard to any work which was intended to be subcontracted to an MBE and/or WBE to the extent that the Agency has determined that such work is not needed.

14. If **Participation Goals** have been established for this Contract or a Task Order issued pursuant to this Contract, at least once annually during the term of the Contract or Task Order, as applicable, Agency shall review the Contractor's progress toward attainment of its **M/WBE** Utilization Plan, including but not limited to, by reviewing the percentage of work the Contractor has actually awarded to MBE and/or WBE subcontractors and the payments the Contractor made to such subcontractors.

15. If **Participation Goals** have been established for this Contract or a Task Order issued pursuant to this Contract, Agency shall evaluate and assess the Contractor's performance in meeting those goals, and such evaluation and assessment shall become part of the Contractor's overall contract performance evaluation.

PART B

MISCELLANEOUS

1. The Contractor shall take notice that, if this solicitation requires the establishment of a **M/WBE** Utilization Plan, the resulting contract may be audited by DSBS to determine compliance with Section 6-129. See §6-129(e)(10). Furthermore, such resulting contract may also be examined by the City's Comptroller to assess compliance with the **M/WBE** Utilization Plan.

2. Pursuant to DSBS rules, construction contracts that include a requirement for a **M/WBE** Utilization Plan shall not be subject to the law governing Locally Based Enterprises set forth in Section 6-108.1 of the Administrative Code of the City of New York.

3. DSBS is available to assist contractors and potential contractors in determining the availability of MBEs and/or WBEs to participate as subcontractors, and in identifying opportunities that are appropriate for participation by MBEs and/or WBEs in contracts.

4. Prospective contractors are encouraged to enter into qualified joint venture agreements with MBEs and/or WBEs as defined by Section 6-129(c)(30).

5. By submitting a bid or proposal the Contractor hereby acknowledges its understanding of the M/WBE Program requirements set forth herein and the pertinent provisions of Section 6-129, and any rules promulgated thereunder, and if awarded this Contract, the Contractor hereby agrees to comply with the M/WBE Program requirements of this Contract and pertinent provisions of Section 6-129, and any rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract. The Contractor hereby agrees to make all reasonable, good faith efforts to solicit and obtain the participation of MBEs and/or WBEs to meet the required **Participation Goals**.

ARTICLE II. ENFORCEMENT

1. If Agency determines that a bidder or proposer, as applicable, has, in relation to this procurement, violated Section 6-129 or the DSBS rules promulgated pursuant to Section 6-129, Agency may disqualify such bidder or proposer, as applicable, from competing for this Contract and the Agency may revoke such bidder's or proposer's prequalification status, if applicable.

2. Whenever Agency believes that the Contractor or a subcontractor is not in compliance with Section 6-129 or the DSBS rules promulgated pursuant to Section 6-129, or any provision of this Contract that implements Section 6-129, including, but not limited to any **M/WBE** Utilization Plan, Agency shall send a written notice to the Contractor describing the alleged noncompliance and offering the Contractor an opportunity to be heard. Agency shall then conduct an investigation to determine whether such Contractor or subcontractor is in compliance.

3. In the event that the Contractor has been found to have violated Section 6-129, the DSBS rules promulgated pursuant to Section 6-129, or any provision of this Contract that implements Section 6-129, including, but not limited to, any **M/WBE** Utilization Plan, Agency may determine that one of the following actions should be taken:

(a) entering into an agreement with the Contractor allowing the Contractor to cure the violation;

(b) revoking the Contractor's pre-qualification to bid or make proposals for future contracts;

(c) making a finding that the Contractor is in default of the Contract;

(d) terminating the Contract;

(e) declaring the Contractor to be in breach of Contract;

(f) withholding payment or reimbursement;

(g) determining not to renew the Contract;

(h) assessing actual and consequential damages;

(i) assessing liquidated damages or reducing fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the M/WBE Program, or in meeting the purposes of the Contract, the costs of meeting utilization goals through additional procurements, the administrative costs of investigation and enforcement, or other factors set forth in the Contract;

(j) exercising rights under the Contract to procure goods, services or construction from another contractor and charge the cost of such contract to the Contractor that has been found to be in noncompliance; or

(k) taking any other appropriate remedy.

4. If an **M/WBE** Utilization Plan has been submitted, and pursuant to this Article II, Section 3, the Contractor has been found to have failed to fulfill its **Participation Goals** contained in its **M/WBE** Utilization Plan or the **Participation Goals** as modified by Agency pursuant to Article I, Part A, Section 11, Agency may assess liquidated damages in the amount of ten percent (10%) of the difference between the dollar amount of work required to be awarded to MBE and/or WBE firms to meet the **Participation Goals** and the dollar amount the Contractor actually awarded and paid, and/or credited, to MBE and/or WBE firms. In view of the difficulty of accurately ascertaining the loss which the City will suffer by reason of Contractor's failure to meet the **Participation Goals**, the foregoing amount is hereby fixed and agreed as the liquidated damages that the City will suffer by reason of such failure, and not as a penalty. Agency may deduct and retain out of any monies which may become due under this Contract the amount of any such liquidated damages; and in case the amount which may become due under this Contract shall be less than the amount of liquidated damages suffered by the City, the Contractor shall be liable to pay the difference.

5. Whenever Agency has reason to believe that an MBE and/or WBE is not qualified for certification, or is participating in a contract in a manner that does not serve a commercially useful function (as defined in Section 6-129(c)(8)), or has violated any provision of Section 6-129, Agency shall notify the Commissioner of DSBS who shall determine whether the certification of such business enterprise should be revoked.

6. Statements made in any instrument submitted to Agency pursuant to Section 6-129 shall be submitted under penalty of perjury and any false or misleading statement or omission shall be grounds for the application of any applicable criminal and/or civil penalties for perjury. The making of a false or fraudulent statement by an MBE and/or WBE in any instrument submitted pursuant to Section 6-129 shall, in addition, be grounds for revocation of its certification.

7. The Contractor's record in implementing its **M/WBE** Utilization Plan shall be a factor in the evaluation of its performance. Whenever Agency determines that a Contractor's compliance with an **M/WBE** Utilization Plan has been unsatisfactory, Agency shall, after consultation with the City Chief Procurement Officer, file an advice of caution form for inclusion in PASSPort as caution data.

Affirmation

The Bidder affirms and declares:

1. The said bidder is of lawful age and the only one interested in this bid; and no person, firm or corporation other than hereinbefore named has any interest in this bid, or in the Contract proposed to be taken.

2. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

3. No councilman or other officer or employee or person whose salary is payable in whole or in part from the City Treasury is directly or indirectly interested in this bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof.

4. The bidder is not in arrears to the City of New York upon debt or contract or taxes, and is not a defaulter, as surety or otherwise, upon any obligation of the City of New York, and has not been declared not responsible, or disqualified, by any agency of the City of New York or State of New York, nor is there any proceeding pending relating to the responsibility or qualification of the bidder to receive public contracts except as disclosed in PASSPort.

5. The bidder hereby affirms that is has paid all applicable City income, excise and other taxes for all it has conducted business activities in New York City.

6. The bidder, as an individual, or as a member, partner, director or officer of the bidder, if the same be a firm, partnership or corporation, executes this document expressly warranting and representing that should this bid be accepted by the City and the Contract awarded to him, he and his subcontractors engaged in the performance:

   (1) will comply with the provisions of Section 6-108 of the Administrative Code of the City of New York and the non-discrimination provisions of Section 220a of the New York State Labor Law, as more expressly and in detail set forth in the Agreement; (2) will comply with Section 6-109 of the Administrative Code of the City of New York in relation to minimum wages and other stipulations as more expressly and in detail set forth in the Agreement; (3) have complied with the provisions of the aforesaid laws since their respective effective dates, and (4) will post notices to be furnished by the City, setting forth the requirements of the aforesaid laws in prominent and conspicuous places in each and every plant, factory, building and structure where employees engaged in the performance of the Contract can readily view it, and will continue to keep such notices posted until the supplies, materials and equipment, or work labor and services required to be furnished or rendered by the Contractor have been finally accepted by the City. In the event of any breach or violation of the foregoing, the Contractor may be subject to damages, liquidated or otherwise, cancellation of the Contract and suspension as a

bidder for a period of three years. (The words, "the bidder", "he", "his", and "him" where used shall mean the individual bidder, firm, partnership or corporation executing this bid).

7. Compliance Report

   The bidder, as an individual, or as a member, partner, director, or officer of the bidder, if the same be a firm, partnership, or corporation, (1) represents that his attention has been specifically drawn to Executive Order No. 50, dated April 25, 1980, on Equal Employment Compliance of the contract, and (2) warrants that he will comply with the provisions of Executive Order No. 50. The Employment Report must be submitted as part of the bid.

8. The bidder, as an individual, or as a member, partner, director, or officer of the bidder, if the same be a firm, partnership, or corporation, executes this document expressly warranting that he will comply with: (1) the provision of the contract on providing records, Chapter 8.

9. By submission of this bid, the bidder certifies that it now has and will continue to have the financial capability to fully perform the work required for this contract. Any award of this contract will be made in reliance upon such certification. Upon request therefor, the bidder will submit written verification of such financial capability in a form that is acceptable to the department.

10. In accordance with Section 165 of the State Finance Law, the bidder agrees that tropical hardwoods, as defined in Section 165 of the State Finance Law, shall not be utilized in the performance of this Contract, except as the same are permitted by the foregoing provision of law.

11. The bidder has visited and examined the site of the work and has carefully examined the Contract in the form approved by the Corporation Counsel, and will execute the Contract and perform all its items, covenants and conditions, and will provide, furnish and deliver all the work, materials, supplies, tools and appliances for all labor and materials necessary or required for the hereinafter named work, all in strict conformity with the Contract, for the prices set forth in the Bid Schedule.

12. M/WBE UTILIZATION PLAN: By signing its bid, the bidder agrees to the M/WBE Vendor Certification and Required Affirmations set forth below, unless a full waiver of the Participation Goals is granted.

    I hereby:

    1) acknowledge my understanding of the M/WBE participation requirements as set forth in this Contract and the pertinent provisions of Section 6-129 of the Administrative Code of the City of New York and the rules promulgated thereunder;

    2) affirm that the information supplied in support of the M/WBE Utilization Plan is true and correct;

    3) agree, if awarded this Contract, to comply with the M/WBE participation requirements of this Contract, the pertinent provisions of Section 6-129, and the rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract;

    4) agree and affirm that it is a material term of this Contract that the Vendor will award the total dollar value of the M/WBE Participation Goals to certified MBEs and/or WBEs, unless a full waiver is obtained or such goals are modified by the Agency; and

    agree and affirm, if awarded this Contract, to make all reasonable, good faith efforts to meet the M/WBE Participation Goals, or If a partial waiver is obtained or such goals are modified by the Agency, to meet the modified Participation Goals by soliciting and obtaining the participation of certified MBE and/or WBE firms.

Special Notice to Bidders – Proprietary Items

A. General: A proprietary item required for the Project is specified below. The Contractor is required to provide and install such proprietary item. The Contractor must provide the specified item from the designated manufacturer. Substitutions are not permissible and will not be approved. More detailed information regarding the item is set forth in the Specifications. Such information includes item description, as well as requirements for installation and related materials.

B. Bid: In preparing its lump sum bid, the Contractor must include in its bid any costs for the purchase of the proprietary item, as well as any costs above and beyond the purchase price, including, without limitation, any costs for transportation, including delivery, shipping or special handling costs, any costs for installation, and any costs for related materials, as well as any mark-up for the Contractor's overhead and profit.

C. Required Proprietary Item(s):

CONTRACT NO. 1:

1. Proprietary Item: *Door Hardware*
   Specification Section: *087100 Door Hardware*
   Manufacturer: *BEST Access System*

2. Proprietary Item: *Acoustic Ceiling Panel*
   Specification Section: *095113 Acoustical Panel Ceilings*
   Manufacturer: *CertainTeed Decoustics Claro*

3. Proprietary Item: *Toilet Tissue Dispenser*
   Specification Section: *102813 Toilet Accessories*
   Manufacturer: *Bobrick B-2890*

4. Proprietary Item: *Paper Towel Dispenser*
   Specification Section: *102813 Toilet Accessories*
   Manufacturer: *Bobrick B-2860*

5. Proprietary Item: *Waste Receptacle*
   Specification Section: *102813 Toilet Accessories*
   Manufacturer: *Bobrick B-279*

6. Proprietary Item: *Circular Waste Receptacle*
   Specification Section: *102813 Toilet Accessories*
   Manufacturer: *Bobrick B-2400*

7. Proprietary Item: *Soap Dispenser*
   Specification Section: *102813 Toilet Accessories*
   Manufacturer: *Bobrick B-26637*

8. Proprietary Item: *Grab Bars*
   Specification Section: *102813 Toilet Accessories*
   Manufacturer: *Bobrick B-5806 Series*

9. Proprietary Item: *Sanitary Napkin Disposal Unit*
   Specification Section: *102813 Toilet Accessories*
   Manufacturer: *Grainger Tough Guy 1ECK9*

10. Proprietary Item: *Seat Cover Dispenser*
    Specification Section: *102813 Toilet Accessories*
    Manufacturer: *Bobrick B-221 Classic series*

11. Proprietary Item: *Mirror Unit*
    Specification Section: *102813 Toilet Accessories*
    Manufacturer: *Bobrick B-290 2436*

12. Proprietary Item: *Warm-Air Dryer*
    Specification Section: *102813 Toilet Accessories*
    Manufacturer: *World Dryer SLIMdri 485D17 L-973A*

13. Proprietary Item: *Diaper Changing Station*
    Specification Section: *102813 Toilet Accessories*
    Manufacturer: *Koala Kare KB11-SSWM*

14. Proprietary Item: *Exterior Book Return*
    Specification Section: *115116 Book Depositories*
    Manufacturer: *Lyngsoe Library Mate 2100*

15. Proprietary Item: *Interior Book Return*
    Specification Section: *115116 Book Depositories*
    Manufacturer: *Lyngsoe Library Mate 1200*

16. Proprietary Item: *Book Check*
    Specification Section: *115116 Book Depositories*
    Manufacturer: *Biblioteca Self Check 1000*

17. Proprietary Item: *Book Conveyors*
    Specification Section: *115116 Book Depositories*
    Manufacturer: *Lyngsoe Sortmate 2000*

18. Proprietary Item: *Book Theft Protection System*
    Specification Section: *115119 Book Theft Protection Equipment*
    Manufacturer: *Feig Electronics 690 Crystal Gate Excellence*

19. Proprietary Item: *Library Shelving*
    Specification Section: *115123 Library Stack Systems*
    Manufacturer: *Montel Aetnastak Cantilever Library Shelving System*

20. Proprietary Item: *Direct Digital Control System*
    Specification Section: *230923 Direct Digital Control System for HVAC*
    Manufacturer: *Honeywell JACE Web-8000 with Niagara 4 software*

21. Proprietary Item: *Standard Camera*
    Specification Section: *282000 Video Surveillance*
    Manufacturer: *Axis*

22. Proprietary Item: *Network Video Recorder*
    Specification Section: *282000 Video Surveillance*
    Manufacturer: *Genetec VMS, Current Version 5.4*

23. Proprietary Item: *Secure and Access Device*
    Specification Section: *283121 Area and Perimeter Intrusion Detection*
    Manufacturer: *Honeywell International Inc.*

24. Proprietary Item: *Long-Range Pir Detector*
    Specification Section: *283121 Area and Perimeter Intrusion Detection*
    Manufacturer: *Bosch Security Systems, Inc.*

25. Proprietary Item: *Audible and Visual Alarm Device*
    Specification Section: *283121 Area and Perimeter Intrusion Detection*
    Manufacturer: *Altronic*

26. Proprietary Item: *Fire Alarm System and components*
    Specification Section: *284621.11 Addressable Fire Alarm Systems*
    Manufacturer: *United Technologies Corporation*
    (UTC Climate, Controls & Security – Edwards EST 4)

Bid Price

item_code	item_label	itype_label	Bid Price
1	Lump Sum Bid Amount	Required Item	31801931.75000000

Allowances

item_code	item_label	itype_label	Additions	YOU MUST ENTER 1 IN THE BOXES BELOW	Additions _1
I2_1	ALLOWANCE for Expanded Work (Section 012200 of the DDC General Conditions)	Additional Fees	838787.0000000000	1.00000000	838787.00000000
I2_2	ALLOWANCE for Incidental Asbestos Abatement (Section 028013 of the Specifications)	Additional Fees	15000.0000000000	1.00000000	15000.00000000

Unit Prices for Div 01 Work

item_code	item_label	itype_label	Section	Quantity	Unit	Unit Price	Total
I3_1	Temporary Electrical Service	Required Item	01 50 00 3.4.F	30.0000000000	Month	250.00000000	7500.00000000
I3_2	Temporary Heat	Required Item	01 50 00 3.5.K	30.0000000000	Month	3750.0000000	112500.00000000
I3_3	Field Office	Required Item	01 50 00 3.8.F	36.0000000000	Month	937.50000000	33750.00000000

I3_4	Rodent and Insect Control	Required Item	01 50 00 3.14.H	30.000000000	Month	562.50000000	16875.00000000
I3_5	Security Guards	Required Item	01 50 00 3.18.D	30.000000000	Month	7930.00000000	237900.00000000
I3_6	Sidewalk Sheds	Required Item	01 54 23 1.9	30.000000000	Month	2400.00000000	72000.00000000

Unit Prices for Extra Work

item_code	item_label	itype_label	Section	Quantity	Unit	Unit Price	Total
I4-1_1	Handling, Transportation & Disposal of Non-Hazardous Contaminated Soils	Required Item	02 62 00	841.000000000	TON	131.250000000	110381.250000000
I4-1_2	Sampling & Testing of Contaminated / Potentially Hazardous Soil for Disposal Parameters	Required Item	02 62 00	9.000000000	SET	28125.00000000	253125.00000000
I4-1_3	Handling, Transportation & Disposal of Hazardous Soils	Required Item	02 62 00	280.000000000	TON	300.000000000	84000.00000000
I4-1_4	Health & Safety Plan	Required Item	02 62 00	1.000000000	LS	5000.00000000	5000.00000000
I4-1_5	Removal, Treatment & Discharge / Disposal of Contaminated Water	Required Item	02 62 00	5.000000000	DAY	31250.00000000	156250.00000000

I4-1_6	Sampling & Testing of Contaminated Water	Required Item	02 62 00	5.0000000000	SET	25000.00000000	125000.00000000

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS. That we, Stalco Construction, Inc.

hereinafter referred to as the "Principal", and Endurance Assurance Corporation

hereinafter referred to as the "Surety" are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "CITY", or to its successors and assigns in the penal sum of

Ten Percent of Proposal Price

($ 10% of P.P.), Dollars lawful money of the United States, for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas, the Principal is about to submit (or has submitted) to the City the accompanying proposal, hereby made a part hereof, to enter into a contract in writing for Project ID: LQQ122-RG

Rego Park Library: New Facility

NOW, THEREFORE, the conditions of this obligation are such that if the Principal shall not withdraw said Proposal without the consent of the City for a period of forty-five (45) days after the opening of bids and in the event of acceptance of the Principal's Proposal by the City, if the Principal shall:

(a) Within ten (10) days after notification by the City, execute in quadruplicate and deliver to the City all the executed counterparts of the Contract in the form set forth in the Contract Documents, in accordance with the proposal as accepted, and

(b) Furnish a performance bond and separate payment bond, as may be required by the City, for the faithful performance and proper fulfillment of such Contract, which bonds shall be satisfactory in all respects to the City and shall be executed by good and sufficient sureties, and

(c) In all respects perform the agreement created by the acceptance of said Proposal as provided in the Information for Bidders, bound herewith and made a part hereof, or if the City shall reject the aforesaid Proposal, then this obligation shall be null and void; otherwise to remain in full force and effect.

In the event that the Proposal of the Principal shall be accepted and the Contract be awarded to the Principal the Surety hereunder agrees subject only to the payment by the Principal of the premium therefore, if requested by the City, to write the aforementioned performance and payment bonds in the form set forth in the Contract Documents.

It is expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

There shall be no liability under this bond if, in the event of the acceptance of the Principal's Proposal by the City, either a performance bond or payment bond, or both, shall not be required by the City on or before the 30th day after the date on which the City signs the Contract.

The surety, for the value received, hereby stipulates and agrees that the obligations of the Surety and its bond shall in no way be impaired or affected by any postponements of the date upon which the City will receive or open bids, or by any extensions of the time within which the City may accept the Principal's Proposal, or by any waiver by the City of any of the requirements of the Information for Bidders, and the Surety hereby waives notice of any such postponements, extensions, or waivers.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers the 13th day of November, 2024.

(Seal)

Stalco Construction, Inc. (L.S.)
Principal

By: Alan Wahmias - President

(Seal)

Endurance Assurance Corporation
Surety

By: Susan Lupski
Susan Lupski, Attorney-In-Fact

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of New York County of Suffolk ss:
On this 13 day of November, 2024, before me personally came Alan Nahmias to me known, who, being by me duly sworn, did depose and say that he/she/they resides at 22 Beach Hill Dr. Ft. Salonga, NY 11768
that he/she/they is the President of Stalco Construction, Inc.
the corporation described in and which executed the foregoing instrument; that he/she/they knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he/she/they signed his name thereto by like order.

Patricia Anne Nevin

PATRICIA ANNE NEVIN
Notary Public - State of New York
No. 01NE6392027
Qualified in Suffolk County
My Commission Expires May 20, 2027

Notary Public

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

State of _____ County of _____ ss:
On this _____ day of _____, _____, before me personally appeared _____ to me known and known to me to be one of the members of the firm of _____ described in and who executed the foregoing instrument, and he/she/they acknowledged to me that he/she/they executed the same as and for the act and deed of said firm.

_____

Notary Public

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

State of _____ County of _____ ss:
On this _____ day of _____, _____, before me personally appeared _____ to me known and known to me to be the person described in and who executed the foregoing instrument and acknowledged that he/she/they executed the same.

_____

Notary Public

AFFIX ACKNOWLEDGMENTS AND JUSTIFICATION OF SURETIES

ACKNOWLEDGEMENT OF SURETY COMPANY

STATE OF NEW YORK

COUNTY OF NASSAU

On this November 13, 2024, before me personally came Susan Lupski to me known, who, being by me duly sworn, did depose and say; that he/she resides in Nassau County, State of New York, that he/she is the Attorney-In-Fact of the Endurance Assurance Corporation the corporation described in which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that is was so affixed by the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order; and the affiant did further depose and say that the Superintendent of Insurance of the State of New York, has, pursuant to Section 1111 of the Insurance Law of the State of New York, issued to Endurance Assurance Corporation (Surety) his/her certificate of qualification evidencing the qualification of said Company and its sufficiency under any law of the State of New York as surety and guarantor, and the propriety of accepting and approving it as such; and that such Certificate has not been revoked.

Notary Public

STEFANIE WEBER
Notary Public, State of New York
Registration No. 01WE6432035
Qualified in Nassau County
Commission Expires April 25, 2026

SOMPO INTERNATIONAL
INSURANCE

POWER OF ATTORNEY

2697

KNOW ALL BY THESE PRESENTS, that **Endurance Assurance Corporation, a Delaware corporation ('EAC'), Endurance American Insurance Company, a Delaware corporation ('EAIC'), Lexon Insurance Company, a Texas corporation ('LIC'), and/or Bond Safeguard Insurance Company, a South Dakota corporation ('BSIC'), each,** a "Company" and collectively, **"Sompo International,"** do hereby constitute and appoint: **Vincent A. Walsh, Louis J. Spina, Thomas Bean, Camille Maitland, Colette R. Chisholm, Dana Granice, Desiree Cardlin, George O. Brewster, Gerard S. Macholz, Karolynne Ramirez, Katherine Acosta, Lee Ferrucci, Michelle Wannamaker, Nelly Renchiwich, Peter F. Jones, Robert T. Pearson, Susan Lupski**
as true and lawful Attorney(s)-In-Fact to make, execute, seal, and deliver for, and on its behalf as surety or co-surety; bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking so made, executed and delivered shall obligate the Company for any portion of the penal sum thereof in excess of the sum of **One Hundred Million ($100,000,000.00)**

Such bonds and undertakings for said purposes, when duly executed by said attorney(s)-in-fact, shall be binding upon the Company as fully and to the same extent as if signed by the President of the Company under its corporate seal attested by its Corporate Secretary.

This appointment is made under and by authority of certain resolutions adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC, a copy of which appears below under the heading entitled "Certificate".

This Power of Attorney is signed and sealed by facsimile under and by authority of the following resolution adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolution has not since been revoked, amended or repealed:

RESOLVED, that the signature of an individual named above and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signature or seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

IN WITNESS WHEREOF, each Company has caused this instrument to be signed by the following officers, and its corporate seal to be affixed this 25th day of May, 2023.

Endurance Assurance Corporation
By: Richard Appel
Richard Appel; SVP & Senior Counsel

Endurance American Insurance Company
By: Richard Appel
Richard Appel; SVP & Senior Counsel

Lexon Insurance Company
By: Richard Appel
Richard Appel; SVP & Senior Counsel

Bond Safeguard Insurance Company
By: Richard Appel
Richard Appel; SVP & Senior Counsel

Endurance Assurance Corporation CORPORATE SEAL 2002 DELAWARE

Endurance American Insurance Company CORPORATE SEAL 1996 DELAWARE

LEXON INSURANCE COMPANY CORPORATE SEAL MARCH 16, 1984 STATE OF TEXAS

BOND SAFEGUARD INSURANCE COMPANY A SOUTH DAKOTA INSURANCE COMPANY

ACKNOWLEDGEMENT

On this 25th day of May, 2023, before me, personally came the above signatories known to me, who being duly sworn, did depose and say that he/they is an officer of each of the Companies; and that he executed said instrument on behalf of each Company by authority of his office under the by-laws of each Company.

By: Amy Taylor
Amy Taylor, Notary Public – My Commission Expires 3/9/27

AMY TAYLOR STATE OF TENNESSEE NOTARY PUBLIC DAVIDSON COUNTY

CERTIFICATE

I, the undersigned Officer of each Company, DO HEREBY CERTIFY that:

1. That the original power of attorney of which the foregoing is a copy was duly executed on behalf of each Company and has not since been revoked, amended or modified; that the undersigned has compared the foregoing copy thereof with the original power of attorney, and that the same is a true and correct copy of the original power of attorney and of the whole thereof;
2. The following are resolutions which were adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolutions have not since been revoked, amended or modified:
   "RESOLVED, that each of the individuals named below is authorized to make, execute, seal and deliver for and on behalf of the Company any and all bonds, undertakings or obligations in surety or co-surety with others: RICHARD M. APPEL, MATTHEW E. CURRAN, MARGARET HYLAND, SHARON L. SIMS, CHRISTOPHER L. SPARRO,
   and be it further
   RESOLVED, that each of the individuals named above is authorized to appoint attorneys-in-fact for the purpose of making, executing, sealing and delivering bonds,
   undertakings or obligations in surety or co-surety for and on behalf of the Company."
3. The undersigned further certifies that the above resolutions are true and correct copies of the resolutions as so recorded and of the whole thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the corporate seal this 13th day of November, 20 24

By: Daniel S. Lute, Secretary

NOTICE: U. S. TREASURY DEPARTMENT'S OFFICE OF FOREIGN ASSETS CONTROL (OFAC)

No coverage is provided by this Notice nor can it be construed to replace any provisions of any surety bond or other surety coverage provided. This Notice provides information concerning possible impact on your surety coverage due to directives issued by OFAC. **Please read this Notice carefully.**
The Office of Foreign Assets Control (OFAC) administers and enforces sanctions policy, based on Presidential declarations of "national emergency". OFAC has identified and listed numerous foreign agents, front organizations, terrorists, terrorist organizations, and narcotics traffickers as "Specially Designated Nationals and Blocked Persons". This list can be located on the United States Treasury's website – https://www.treasury.gov/resource-center/sanctions/SDN-List.
In accordance with OFAC regulations, if it is determined that you or any other person or entity claiming the benefits of any coverage has violated U.S. sanctions law or is a Specially Designated National and Blocked Person, as identified by OFAC, any coverage will be considered a blocked or frozen contract and all provisions of any coverage provided are immediately subject to OFAC. When a surety bond or other form of surety coverage is considered to be such a blocked or frozen contract, no payments nor premium refunds may be made without authorization from OFAC. Other limitations on the premiums and payments may also apply.

Any reproductions are void.

Surety Claims Submission: LexonClaimAdministration@sompo-intl.com
Telephone: 615-553-9500 Mailing Address: Sompo International; 12890 Lebanon Road; Mount Juliet, TN 37122-2870

ENDURANCE ASSURANCE CORPORATION
Balance Sheet - Statutory - Basis
December 31, 2023

Assets:		
Bonds	$	8,840,516,134
Preferred stocks		14,559,098
Common stocks		2,502,912,644
Cash, cash equivalents, and short-term investments		547,214,855
Other invested assets		367,228,494
Receivables for securities		12,539,247
Total cash and invested assets		**12,284,970,472**
Agents' balances or uncollected premiums		3,639,295,463
Reinsurance recoverable on loss and loss adjustment expense payments		866,922,861
Funds held by or deposited with reinsured companies		116,173,785
Investment income due and accrued		59,715,007
Current federal and foreign income tax recoverable and interest thereon		765,086
Net deferred tax asset		194,151,100
Receivables from parent, subsidiaries and affiliates		36,069,122
Other assets		240,998,501
Total admitted assets	$	**17,439,061,397**
Liabilities:		
Loss and loss adjustment expenses	$	6,724,893,327
Reinsurance payable on paid loss and loss adjustment expenses		823,698,569
Commissions payable, contingent commissions and other similar charges		(1,662,639)
Other expenses		28,177,519
Taxes, licenses and fees (excluding federal and foreign income taxes)		27,009,410
Unearned premiums		2,749,272,278
Advanced Premium		10,285,830
Ceded reinsurance premiums payable		1,277,805,256
Funds held by company under reinsurance treaties		75,781,757
Amounts withheld or retained by company for account of others		732,081,177
Remittances and items not allocated		248,815,866
Provision for reinsurance		58,958,628
Payable to parent, subsidiaries and affiliates		172,805,784
Payable for securities		50,301,420
Other liabilities		70,939,621
Total liabilities		**13,049,163,803**
Capital and surplus:		
Common capital stock		5,000,000
Surplus notes		200,000,000
Gross paid in and contributed surplus		3,480,137,280
Unassigned funds (surplus)		703,291,886
Aggregate write-ins for special surplus funds		1,468,428
Total capital and surplus		**4,389,897,594**
Total liabilities and capital and surplus	$	**17,439,061,397**

I, Hana Entela, Treasurer of Endurance Assurance Corporation (the "Company") do hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities, Capital and Surplus of the Company as of December 31, 2023 prepared in conformity with accounting practices prescribed or permitted by the State of Delaware Department of Insurance. The foregoing statement should not be taken as a complete statement of financial condition of the Company. Such a statement is available upon request at the Company's office located at 4 Manhattanville Road, Purchase, NY 10577.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Company at Purchase, New York.

Hana Entela

Subscribed and sworn to before me this 5th day of March, 2024

Fiona McNamara

Endurance Assurance Corporation CORPORATE SEAL 2002 DELAWARE

Fiona McNamara STATE OF NEW YORK NOTARY PUBLIC Qualified in Rockland County 01MC5031695 MY COMMISSION EXPIRES 07/14/2025

SPECIAL EXPERIENCE REQUIREMENTS

Special Experience Requirements apply as indicated below.

Special Experience Requirements are **not** applicable to **the Bidder** for this contract since the Department of Design and Construction has established a pre-qualified list ("**PQL"**) of contractors for furnishing all labor, materials and equipment, necessary and required to perform work on facilities determined by the City to be General Construction – Large Projects. This procurement for the specified work is being advertised and let solely to bidders who were previously pre-qualified based on their prior experience and placed on the General Construction – Large Projects PQL. Bids submitted by other than such pre-qualified bidders will be rejected as non-responsive bids. The below listed Special Experience Requirements apply solely to the Contractor/Sub-contractor performing the specific area(s) of work shown and the manufacturer that will supply or fabricate specific material or equipment.

Specific Areas of Work:	**General Construction Work**	**___X___ YES**	**_____ NO**
Manufacturer:	**General Construction Work**	**___X___ YES**	**_____ NO**

(A) **SPECIAL EXPERIENCE REQUIREMENTS FOR SPECIFIC AREAS OF WORK**: The special experience requirements set forth below apply to the contractor or subcontractor that will perform specific areas of work. Compliance with such experience requirements will be evaluated after an award of contract. Within two (2) weeks of such award, the contractor will be required to submit the qualifications of the contractor or subcontractor that will perform these specific areas of work. If the bidder intends to perform these specific areas of work with its own forces, it must demonstrate compliance with the special experience requirements. If the bidder intends to subcontract these specific areas of work, its proposed subcontractor(s) must demonstrate compliance with the special experience requirements. Once approved, no substitution will be permitted, unless the qualifications of the proposed replacement have been approved in writing in advance by the City. The bidder is advised to carefully review these special experience requirements prior to submitting its bid, as such experience requirements will be strictly enforced.

(1) Special experience requirements apply to the contractor or subcontractor that will perform specific areas of work specified in the section(s) set forth below.

General Construction Work

- 042000: Unit Masonry
- 075423: Thermoplastic-Polyolefin (TPO) Roofing
- 076200: Sheet Metal Flashing
- 077273: Vegetated Roof Systems
- 084213: Aluminum-Framed Entrances and Storefronts
- 084423: Structural-Sealant-Glazed Curtain Walls

(2) Special experience requirements applicable to the contractor or subcontractor who will perform specific areas of work are summarized below.

- For Sections 042000, 077273, 084213, and 084423 the contractor or subcontractor performing the work of this section must meet the requirements of DDC General Conditions Section 014000 "Quality Requirements," Article 1.7.C.1.

- For Section 076200, the contractor or subcontractor performing the work specified above must meet the requirements of DDC General Conditions Section 014000 "Quality Requirements," Article 1.7.C.2.

- For Section 075423, the contractor or subcontractor performing the work of this section must meet the requirements of DDC General Conditions Section 014000 "Quality Requirements," Article 1.7.C.3.

(3) For each project submitted to demonstrate compliance with the special experience requirements for specific areas of work, the contractor or proposed subcontractor will be required to complete the Qualification Form included in PASSPort.

a. The City will only evaluate a project if the following criteria are met: (1) the project is described on the Qualification Form, and (2) all information on the Qualification Form is provided. The City will not evaluate any project which does not comply with the criteria set forth herein, including any project which is referred to only on the resume of an individual.

b. For Section 075423 Thermoplastic-Polyolefin (TPO) Roofing, the contractor or subcontractor must specify, for each qualifying project submitted, the type of roofing system utilized and provide proof that the manufacturer's warranty for that project was issued. The City will only evaluate a project if the following criteria are met: (1) the project is described on the Qualification Form, and (2) all information required to be provided by the contractor or subcontractor on the Qualification Form is actually provided. The City will not evaluate any project which does not comply with the criteria set forth herein, including any project which is referred to only on the resume of an individual.

(B) **SPECIAL EXPERIENCE REQUIREMENTS FOR MANUFACTURER(S)**: The special experience requirements set forth below apply to the manufacturer(s) that will supply or fabricate specific material or equipment. Compliance with such experience requirements will be evaluated after an award of contract. Within two (2) weeks of award, the contractor will be required to submit the qualifications of the proposed manufacturer(s). Once approved, no substitution will be permitted, unless the qualifications of the proposed replacement have been approved in writing in advance by the City.

(1) Special experience requirements apply to the manufacturer(s) of material and/or equipment specified in the section(s) set forth below.

General Construction

- 064023: Interior Architectural Woodwork
- 064216: Flush Wood Paneling
- 071613: Polymer Modified Cement Waterproofing
- 071616: Crystalline Waterproofing
- 072010: Wall Framing Support System for Continuous Insultation

(2) Special experience requirements applicable to the manufacturer(s) of specified material or equipment are summarized below.

- The manufacturer providing the material or equipment specified in this section must meet the requirements of DDC General Conditions Section 014000 "Quality Requirements," Article 1.7.C.5.

Notice to Bidders
Bidder's Identification of Subcontractors

Please be advised that pursuant to GML § 101(5) each bidder is required to submit with its bid the names of subcontractors it intends to use to perform the following work on this contract, as well as the agreed-upon amount to be paid to each subcontractor:

- plumbing and gas fitting;
- steam heating, hot water heating, ventilating and air conditioning apparatus; and
- electric wiring and standard illuminating fixtures.

The list of subcontractors is to be submitted by completing the Bidder's Identification of Subcontractors form ("BIDS Form") on the next page. The BIDS Form provides for the identification of any subcontractors intended to be used in any of the three trades listed above. If the bidder intends to use its own forces for any of the above listed work, the bidder must indicate so on the BIDS Form.

The completed BIDS Form must be uploaded in the Sealed Subcontractor List subtab of the Subcontractors and Joint Ventures tab of the RFx. Failure to submit the properly completed BIDS Form including the names of subcontractors and the agreed-upon amounts to be paid to each will result in the rejection of the bid as non-responsive.

Please Note: For any contract that is subject to M/WBE Participation Goals under Section § 6-129 of the Administrative Code of the City of New York, if the bidder's intention to use its own forces to do any of the above-referenced work would result in failure to attain the Participation Goals identified in the M/WBE Utilization Plan, the bidder must request and obtain a full or partial waiver of the Participation Goals (Schedule B – Waiver) in advance of bid submission. The bidder must submit the approved waiver determination or otherwise agree to the Participations Goals as stated in the Schedule B (Parts I and II) as part of a responsive bid submission.

After the low bid is announced, the sealed list submitted by the low bidder will be opened and the names of the subcontractors will be announced. The sealed lists of subcontractors submitted by all other bidders will be maintained by the Agency unopened unless such bidder becomes the low bidder (e.g., the initial low bidder is found non-responsive). All unopened lists of subcontractors will be deleted from PASSPort after the contract is awarded.

After bid submission, any change of subcontractor or agreed-upon amount to be paid to each will require approval of the Agency upon a showing of a legitimate construction need which includes, but is not limited to, a change in project specifications, a change in project material costs, a change to subcontractor status as determined pursuant to NYS Labor Law § 222(2)(e), or if the subcontractor has become otherwise unwilling, unable or unavailable to perform the subcontract.

Bidder's Identification of Subcontractors (BIDS Form)

Please list the subcontractors and agreed-upon amounts to be paid to each. Please note if any trade is not applicable to this project. If any of the work in the trade categories below is split between two or more subcontractors, please provide a description of the work to be performed by each subcontractor. If self-performing, please list your own name.

Please Note: Bidder may satisfy any required M/WBE Subcontractor Participation Goals by proposing one or more M/WBE subcontractors for any portion of the work to be performed by the below trades.

1. Plumbing and Gas Fitting Contractor(s):

   LOUIS BUTTERMARK & SONS
   (Subcontractor Name)

   $ 1,134,926.00/100
   (Agreed-upon amount to be paid to Subcontractor)

   _____
   (Subcontractor Name)

   $ _____
   (Agreed-upon amount to be paid to Subcontractor)

   Description of work for each subcontractor:

   PLUMBING

2. Steam Heating, Hot Water Heating, Ventilating and Air Conditioning Apparatus Contractor(s):

   SHONA MECHANICAL
   (Subcontractor Name)

   $ 2,782,595.00/100
   (Agreed-upon amount to be paid to Subcontractor)

   _____
   (Subcontractor Name)

   $ _____
   (Agreed-upon amount to be paid to Subcontractor)

   Description of work for each subcontractor:

   HVAC

3. Electric Wiring and Standard Illuminating Fixtures Contractor(s):

   ELMHURST ELECTRIC
   (Subcontractor Name)

   $ 3,850,000.00/100
   (Agreed-upon amount to be paid to Subcontractor)

   _____
   (Subcontractor Name)

   $ _____
   (Agreed-upon amount to be paid to Subcontractor)

   Description of work for each subcontractor:

   ELECTRIC

NYC Mayor's Office of Contract Services

SCHEDULE B – M/WBE Utilization Plan

Part 1: M/WBE Participation Goals

Contract Overview (To be completed by contracting agency)

APT E-Pin# TBD | FMS Project ID# LQQ122-RG

Project Title LQQ122-RG | Agency PIN# 8502025LQ0003C

Contracting Agency Department of Design and Construction | Bid/Proposal Response Date 9/14/23

Agency Address 30-30 Thomson Avenue | City Long Island City | State NY | ZIP 11101

Contact Person Heidi Sanchez | Title MWBE Compliance Analyst

Telephone 718-391-1234 | Email sanchezhe@ddc.nyc.gov

Project Description (attach additional pages if necessary)

Rego Park Library New Facility

Bidder or proposer ☐ is required OR ☒ is not required to specifically identify the contact information of all M/WBE firms they intend to use as a subcontractor on this contract, including the M/WBE vendor name, address and telephone number in the space provided below in Part 2 Section 4.

M/WBE Participation Goals for Services

Enter the percentage amount for each category or for an unspecified Goal.

Prime Contract Industry: Construction

Category and Breakdown:

Unspecified 4.00 %

Black American 9.00 %

Hispanic American 14.00 %

Asian American ____ %

Women ____ %

Total Participation Goals 27.00 %
Line 1

Part 2: M/WBE Participation Plan

(To be completed by the bidder/proposer unless granted a full waiver, which must be submitted with the bid/proposal in lieu of this form)

Section 1: Prime Contractor Contact Information

Tax ID# 11-3149290 | FMS Vendor ID# ____

Business Name Stalco Construction, Inc. | Contact Person Alan Nahmias - President

Business Address 1316 Motor Pkwy. | City Islandia | State NY | ZIP 11749

Telephone 631-254-6767 | Email estimating@stalcoconstruction.com

Section 3: Contractor M/WBE Utilization Plan

Please review the Notice to Prospective Contractors for more information on how to obtain credit for M/WBE participation. Check applicable box. The Proposer or Bidder will fulfill the M/WBE Participation Goals:

☐ As an M/WBE Prime Contractor that will self-perform and/or subcontract to other M/WBE firms a portion of the contract the value of which is at least the amount located on Lines 2 or 3 in the panels in Section 2, as applicable. The value of any work subcontracted to non-M/WBE firms will not be credited towards fulfillment of M/WBE Participation Goals. Please check all that apply to Prime Contractor: ☐ MBE ☐ WBE

☐ As a Qualified Joint Venture with an M/WBE partner, in which the value of the M/WBE partner's participation and/or the value of any work subcontracted to other M/WBE firms is at least the amount located on Lines 2 or 3 in the panels in Section 2, as applicable. The value of any work subcontracted to non-M/WBE firms will not be credited towards fulfillment of M/WBE Participation Goals.

☒ As a non-M/WBE Prime Contractor that will enter into subcontracts with M/WBE firms the value of which is at least the amount located on Lines 2 or 3 in the panels in Section 2, as applicable.

Section 2: M/WBE Utilization Goal Calculation

Prime Contractor Adopting Agency Participation Goals
For Prime Contractors (including Qualified Joint Ventures and M/WBE firms) adopting Agency M/WBE Participation Goals.

Total Bid/Proposal Value $ 33,870,000.00

multiplied by x

Total Participation Goals 27.00 %
(Line 1 above)

Calculated M/WBE Participation Amount $ 9,144,900.00
Line 2

OR

Prime Contractor With Partial Waiver Approval Adopting Revised Participation Goals
For Prime Contractors (including Qualified Joint Ventures and M/WBE firms) adopting Revised M/WBE Participation Goals.

Total Bid/Proposal Value $ ____

multiplied by x

Total Revised Participation Goals ____ %

Calculated M/WBE Participation Amount $ ____
Line 3

Tax ID# 11-3149290 APT E-Pin#

Section 4: General Contract Information

What is the expected percentage of the total contract dollar value that you expect to award in subcontracts for services, regardless of M/WBE status? %

Enter a brief description of the type(s) and dollar value of subcontracts for all services you plan to subcontract if awarded this contract, along with the anticipated start and end dates for such subcontracts. For each item, indicate whether the work is designated for participation by an M/WBE. Where the contracting agency's solicitation has indicated a requirement that the bidder or proposer specifically identify the contact information of all M/WBEs they intend to use on this contract, vendors must also include the M/WBE vendor name, address and telephone number in the space provided below. Use additional sheets if necessary.

	Description of Work	Start Date (MM/YY)	End Date (MM/YY)	Planned $ Amount	Designated for M/WBE Y	Designated for M/WBE N	M/WBE Vendor Name	M/WBE Address	M/WBE Telephone
1.	Metal Plate Wall Panels	TBD / TBD	TBD / TBD	$ 178,360.00	☐	☒	Nystrom/Galvin Associates, Inc.	9300 73rd Ave. N., Minneapolis, MN 55428	(800) 547 - 2635
2.	TPO Roofing	TBD / TBD	TBD / TBD	$ 395,000.00	☐	☒	CCM Roofing	105 Bloomingdale Rd., Hicksville, NY 11801	(516) 681 - 3856
3.	Vegetated Roof Systems	TBD / TBD	TBD / TBD	$ 250,124.00	☐	☒	Evergreen Environments LLC	10 Turnberry Lane, Unit 1, Sandy Hook, CT 06482	(800) 547 - 1222
4.	Applied Fire Protection	TBD / TBD	TBD / TBD	$ 110,500.00	☐	☒	CPV Industries	115 S. 2nd St., Suite 2, Bay Shore, NY 11706	(631) 865 - 2328
5.	Intumescent Fire Protection	TBD / TBD	TBD / TBD	$ 18,000.00	☐	☒	CPV Industries	115 S. 2nd St., Suite 2, Bay Shore, NY 11706	(631) 865 - 2328
6.	HM Doors, Frames & Hardware	TBD / TBD	TBD / TBD	$ 120,815.00	☒	☐	JC Ryan EBCO/H&G LLC	1800 New Hwy., Farmingdale, NY 11735	(631) 694 - 0008
7.	Access Doors	TBD / TBD	TBD / TBD	$ 7,500.00	☐	☒	Mar Jam Supply Co, Inc.	885 Conklin St., Farmingdale, NY 11735	(631) 249 - 4900
8.	Floor Door	TBD / TBD	TBD / TBD	$ 5,000.00	☐	☒	Metropolitan Door Industries, Corp.	350 Thorens Ave. Garden City Park, NY 11040	(516) 294 - 1801
9.	Aluminum Storefronts	TBD / TBD	TBD / TBD	$ 901,400.00	☐	☒	Kilroy Architectural Windows, Inc.	425 Austin Place, Bronx, NY 10455	(718) 638 - 2503
10.	Structural Glazed Curtain Walls	TBD / TBD	TBD / TBD	$ 500,000.00	☐	☒	Kilroy Architectural Windows, Inc.	425 Austin Place, Bronx, NY 10455	(718) 638 - 2503

Section 5: Vendor Certification and Required Affirmations

I hereby:

1. *acknowledge my understanding of the M/WBE participation requirements as set forth herein and the pertinent provisions of Section 6-129 of the Administrative Code of the City of New York ("Section 6-129"), and the rules promulgated thereunder;*
2. *affirm that the information supplied in support of this M/WBE Utilization Plan is true and correct;*
3. *agree, if awarded this Contract, to comply with the M/WBE participation requirements of this Contract, the pertinent provisions of Section 6-129, and the rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract;*
4. *agree and affirm that it is a material term of this Contract that the Vendor will award the total dollar value of the M/WBE Participation Goals to certified MBEs and/or WBEs, unless a full waiver is obtained or such Goals are modified by the Agency; and*
5. *agree and affirm, if awarded this Contract, to make all reasonable, good faith efforts to meet the M/WBE Participation Goals, or If a partial waiver is obtained or such Goals are modified by the Agency, to meet the modified Participation Goals by soliciting and obtaining the participation of certified MBE and/or WBE firms.*

Signature Date 02/20/25

Print Name Alan Nahmias Title President

Tax ID# 11-3149290 APT E-Pin#

Section 4: General Contract Information

What is the expected percentage of the total contract dollar value that you expect to award in subcontracts for services, regardless of M/WBE status? ____ %

Enter a brief description of the type(s) and dollar value of subcontracts for all services you plan to subcontract if awarded this contract, along with the anticipated start and end dates for such subcontracts. For each item, indicate whether the work is designated for participation by an M/WBE. Where the contracting agency's solicitation has indicated a requirement that the bidder or proposer specifically identify the contact information of all M/WBEs they intend to use on this contract, vendors must also include the M/WBE vendor name, address and telephone number in the space provided below. Use additional sheets if necessary.

	Description of Work	Start Date (MM/YY)	End Date (MM/YY)	Planned $ Amount	Designated for M/WBE Y	Designated for M/WBE N	M/WBE Vendor Name	M/WBE Address	M/WBE Telephone
1.	Drywall, Acoustics & Carpentry	TBD / TBD	TBD / TBD	$ 2,490,400.00	☒	☐	Island Builders Group, Inc.	256 West 36th St., New York, NY 10018	(917) 209 - 1496
2.	Tile	TBD / TBD	TBD / TBD	$ 84,500.00	☒	☐	Baybrent Construction Corp.	1637 Sycamore Ave., Bohemia, NY 11716	(631) 563 - 4500
3.	Resinous Terrazzo Flooring	TBD / TBD	TBD / TBD	$ 541,450.00	☒	☐	Nationwide Commercial Industrial	91 Cabot Street, West Babylon, NY 11704	(631) 563 - 9000
4.	Tile Carpeting	TBD / TBD	TBD / TBD	$ 35,796.00	☐	☒	Ziba Construction Inc d/b/a 212 Carpet	954 Lexington Ave., Suite 1013, New York, NY 10021	(212) 537 - 9219
5.	Interior/Exterior Painting	TBD / TBD	TBD / TBD	$ 75,000.00	☐	☒	KP Organization, Inc	1850 Pond Rd., Ronkonkoma, NY 11779	(631) 285 - 7112
6.	Visual Display Units	TBD / TBD	TBD / TBD	$ 28,309.00	☐	☒	Magnatag	2031 O'Neill Road Macedon, NY 14502	(315) 986 - 3033
7.	Signage	TBD / TBD	TBD / TBD	$ 40,224.00	☐	☒	Sign Design Group of NY	395 Moreland Rd., Hauppauge, NY 11788	(718) 392 - 779
8.	Toilet Accessories	TBD / TBD	TBD / TBD	$ 26,745.00	☐	☒	A. Liss & Company, Inc.	51-55 59th Place, Woodside, NY 11377	(718) 728 - 600
9.	Fire Extinguishers & Cabinets	TBD / TBD	TBD / TBD	$ 3,210.00	☐	☒	A. Liss & Company, Inc.	51-55 59th Place, Woodside, NY 11377	(718) 728 - 600
10.	Lockers	TBD / TBD	TBD / TBD	$ 10,060.00	☐	☒	Benco, Inc.	10 Madison Rd., Fairfield, NJ 07004	(973) 575 - 4558

Section 5: Vendor Certification and Required Affirmations

I hereby:

1. *acknowledge my understanding of the M/WBE participation requirements as set forth herein and the pertinent provisions of Section 6-129 of the Administrative Code of the City of New York ("Section 6-129"), and the rules promulgated thereunder;*
2. *affirm that the information supplied in support of this M/WBE Utilization Plan is true and correct;*
3. *agree, if awarded this Contract, to comply with the M/WBE participation requirements of this Contract, the pertinent provisions of Section 6-129, and the rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract;*
4. *agree and affirm that it is a material term of this Contract that the Vendor will award the total dollar value of the M/WBE Participation Goals to certified MBEs and/or WBEs, unless a full waiver is obtained or such Goals are modified by the Agency; and*
5. *agree and affirm, if awarded this Contract, to make all reasonable, good faith efforts to meet the M/WBE Participation Goals, or if a partial waiver is obtained or such Goals are modified by the Agency, to meet the modified Participation Goals by soliciting and obtaining the participation of certified MBE and/or WBE firms.*

Signature _____ Date 02/20/25

Print Name Alan Nahmias Title President

Tax ID# 11-3149290 APT E-Pin#

Section 4: General Contract Information

What is the expected percentage of the total contract dollar value that you expect to award in subcontracts for services, regardless of M/WBE status? %

Enter a brief description of the type(s) and dollar value of subcontracts for all services you plan to subcontract if awarded this contract, along with the anticipated start and end dates for such subcontracts. For each item, indicate whether the work is designated for participation by an M/WBE. Where the contracting agency's solicitation has indicated a requirement that the bidder or proposer specifically identify the contact information of all M/WBEs they intend to use on this contract, vendors must also include the M/WBE vendor name, address and telephone number in the space provided below. Use additional sheets if necessary.

	Description of Work	Start Date (MM/YY)	End Date (MM/YY)	Planned $ Amount	Designated for M/WBE Y	Designated for M/WBE N	M/WBE Vendor Name	M/WBE Address	M/WBE Telephone
1.	Flag Poles	TBD / TBD	TBD / TBD	$ 27,725.00	☐	☒	Poletech	97 Gnarles Hollow Rd., East Setauket, NY 11733	(631) 689 - 5525
2.	Book Depositories	TBD / TBD	TBD / TBD	$ 85,851.00	☐	☒	Bibliotheca, LLC	3169 Holcomb Bridge Road, NW, Suite 200, Norcross, GA 30071	(877) 207 - 3127
3.	Book Theft Protection	TBD / TBD	TBD / TBD	$ 125,560.00	☐	☒	Bibliotheca, LLC	3169 Holcomb Bridge Road, NW, Suite 200, Norcross, GA 30071	(877) 207 - 3127
4.	Library Stack Systems	TBD / TBD	TBD / TBD	$ 150,000.00	☐	☒	Montel, Inc./Lucia Group	45 W. Jefryn Blvd., Suite 108, Deer Park, NY 11729	(631) 392 - 4900
5.	Window Shades	TBD / TBD	TBD / TBD	$ 17,506.00	☐	☒	On Point Window Treatments	250 Pehle Ave., Ste 200 Num 276, Saddle Brook, NJ 07663	(208) 576 - 4684
6.	Entrance Floor Grilles	TBD / TBD	TBD / TBD	$ 26,465.00	☐	☒	Nystrom/Galvin Associates, Inc.	9300 73rd Ave. N., Minneapolis, MN 55428	(800) 547 - 2635
7.	Elevators	TBD / TBD	TBD / TBD	$ 196,000.00	☐	☒	Kone Elevator	47-36 36th Street, Long Island City, NY 11101	(347) 374 - 255
8.	Fire Sprinklers	TBD / TBD	TBD / TBD	$ 359,500.00	☐	☒	Sirina Fire Protection Corp.	151 Herricks Rd., Garden City Park, NY 11040	(516) 942 - 400
9.	Plumbing	TBD / TBD	TBD / TBD	$ 1,134,926.00	☐	☒	Louis L. Buttermark & Sons	16-18 New Dorp Lane, Staten Island, NY 10306	(718) 351 - 4200
10.	HVAC	TBD / TBD	TBD / TBD	$ 2,782,595.00	☐	☒	Shona Mechanical Corp.	420 Peconic St., Ronkonkoma, NY 11779	(631) 675 - 609

Section 5: Vendor Certification and Required Affirmations

I hereby:

1. *acknowledge my understanding of the M/WBE participation requirements as set forth herein and the pertinent provisions of Section 6-129 of the Administrative Code of the City of New York ("Section 6-129"), and the rules promulgated thereunder;*
2. *affirm that the information supplied in support of this M/WBE Utilization Plan is true and correct;*
3. *agree, if awarded this Contract, to comply with the M/WBE participation requirements of this Contract, the pertinent provisions of Section 6-129, and the rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract;*
4. *agree and affirm that it is a material term of this Contract that the Vendor will award the total dollar value of the M/WBE Participation Goals to certified MBEs and/or WBEs, unless a full waiver is obtained or such Goals are modified by the Agency; and*
5. *agree and affirm, if awarded this Contract, to make all reasonable, good faith efforts to meet the M/WBE Participation Goals, or If a partial waiver is obtained or such Goals are modified by the Agency, to meet the modified Participation Goals by soliciting and obtaining the participation of certified MBE and/or WBE firms.*

Signature Date 02/20/25

Print Name Alan Nahmias Title President

Tax ID# 11-3149290 APT E-Pin#

Section 4: General Contract Information

What is the expected percentage of the total contract dollar value that you expect to award in subcontracts for services, regardless of M/WBE status? %

Enter a brief description of the type(s) and dollar value of subcontracts for all services you plan to subcontract if awarded this contract, along with the anticipated start and end dates for such subcontracts. For each item, indicate whether the work is designated for participation by an M/WBE. Where the contracting agency's solicitation has indicated a requirement that the bidder or proposer specifically identify the contact information of all M/WBEs they intend to use on this contract, vendors must also include the M/WBE vendor name, address and telephone number in the space provided below. Use additional sheets if necessary.

	Description of Work	Start Date (MM/YY)	End Date (MM/YY)	Planned $ Amount	Designated for M/WBE Y	Designated for M/WBE N	M/WBE Vendor Name	M/WBE Address	M/WBE Telephone
1.	Electrical, Communications & Security	TBD / TBD	TBD / TBD	$ 3,850,000.00	☒	☐	Elmhurst Electrical Corp.	140 Miller Place, Hicksville, NY 11801	(718) 527 - 5271
2.	Earthwork	TBD / TBD	TBD / TBD	$ 710,000.00	☐	☒	Eastport Excavation	774 Marconi Ave., Ronkonkoma, NY 11779	(631) 981 - 2108
3.	Monitoring	TBD / TBD	TBD / TBD	$ 50,000.00	☐	☒	Hirani Engineering & Land Surveying, PC	120 W. John St., Hicksville, NY 11801	(516) 248 - 1010
4.	Soil Erosion & Sediment Control	TBD / TBD	TBD / TBD	$ 23,500.00	☒	☐	Eastport Excavation	774 Marconi Ave., Ronkonkoma, NY 11779	(631) 981 - 2108
5.	Excavation Support & Protection Special Foundation Wall	TBD / TBD	TBD / TBD	$ 2,215,000.00	☐	☒	American Pile & Foundation LLC	61 County Line Rd., Somerville, NJ 08876	(908) 534 - 7430
6.	Tree/Plant Protection & Plants	TBD / TBD	TBD / TBD	$ 21,500.00	☒	☐	Evergreen Environments LLC	10 Tumberry Lane, Sandy Hook, CT 06482	(822) 547 - 1222
7.	Asphalt Paving	TBD / TBD	TBD / TBD	$ 45,000.00	☐	☒	Eastport Excavation	774 Marconi Ave., Ronkonkoma, NY 11779	(631) 981 - 2108
8.	Unit Paving	TBD / TBD	TBD / TBD	$ 59,400.00	☐	☒	Eastport Excavation	774 Marconi Ave., Ronkonkoma, NY 11779	(631) 981 - 2108
9.	Utilities & Piping	TBD / TBD	TBD / TBD	$ 251,223.00	☐	☒	MFM Contracting Corp.	335 Center Ave., Mamaroneck, NY 10543	(914) 777 - 8292
10.		/	/	$	☐	☒			( ) -

Section 5: Vendor Certification and Required Affirmations

I hereby:

1. *acknowledge my understanding of the M/WBE participation requirements as set forth herein and the pertinent provisions of Section 6-129 of the Administrative Code of the City of New York ("Section 6-129"), and the rules promulgated thereunder;*
2. *affirm that the information supplied in support of this M/WBE Utilization Plan is true and correct;*
3. *agree, if awarded this Contract, to comply with the M/WBE participation requirements of this Contract, the pertinent provisions of Section 6-129, and the rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract;*
4. *agree and affirm that it is a material term of this Contract that the Vendor will award the total dollar value of the M/WBE Participation Goals to certified MBEs and/or WBEs, unless a full waiver is obtained or such Goals are modified by the Agency; and*
5. *agree and affirm, if awarded this Contract, to make all reasonable, good faith efforts to meet the M/WBE Participation Goals, or if a partial waiver is obtained or such Goals are modified by the Agency, to meet the modified Participation Goals by soliciting and obtaining the participation of certified MBE and/or WBE firms.*

Signature Date 02/20/25

Print Name Alan Nahmias Title President

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
		DIVISION 01 - GENERAL REQUIREMENTS										
						General Requirements: DIVISION 01 - GENERAL REQUIREMENTS (for details see tab "HardCostGeneralRequirements" at Division 1 General Requirements sheet) EXCLUDING the following 6 items: 1) 01 50 00; 3.4-Temporary Electrical Service. 2) 01 50 00; 3.5-Temporary Heat. 3) 01 50 00; 3.8-Field Office. 4) 01 50 00; 3.14-Rodent and Insect Control. 5) 01 50 00; 3.18-Security Guards. 6) 01 54 23; 1.9-Sidewalk Sheds. These 6 items must be filled out separately on the Bid Submission Form and PASSPort Item Grid.	1.00	JOB				$ 3,831,161.05
						SUB TOTAL						**$ 3,831,161.05**
		DIVISION 02 - EXISTING CONDITIONS										
			02 41 16 Structure Demolition									$ -
						OSHA requirements	18,588.00	gsf				$ -
						Construction removals						$ -
						Interior facilities & controls:						$ -
						Excavate & demolish existing building	7,600.00	gsf	$ 40,000.00	$ 175,000.00	$ 50,000.00	$ 265,000.00
						Haul off site	233.63	cy		$ 55,000.00	$ 150,000.00	$ 205,000.00
						Disposal cost	473.10	tons	$ 50,209.00			$ 50,209.00
						Remove sidewalk	340.00	yds	$ 500.00	$ 500.00	$ 1,000.00	$ 2,000.00
						Remove curb	170.00	lf	$ 1.00	$ 1.00	$ 1.00	$ 3.00
						Protection of existing items	5.00	ea	$ 900.00	$ 1,400.00	$ 200.00	$ 2,500.00
						Mailbox to be removed, protected and reset	2.00	ea	$ 400.00	$ 200.00	$ 400.00	$ 1,000.00
						Remove tree and tree pit	1.00	ea	$ 1.00	$ 1.00	$ 1.00	$ 3.00
						Remove tree pit	2.00	ea	$ 1.00	$ 1.00	$ 1.00	$ 3.00
						Remove bench	1.00	ea	$ 2,000.00	$ 6,000.00	$ 2,000.00	$ 10,000.00
						Remove MEP utilities	200.00	sf	$ 1,000.00	$ 2,000.00	$ 1,000.00	$ 4,000.00
						Remove neighboring concrete paving	395.00	gsf	$ 800.00	$ -	$ -	$ 800.00
						Haul off site	12.14	cy	$ 1.00			$ 1.00
						Disposal cost	24.59	tons	$ 2,458.88		$ 3,500.00	$ 5,958.88
						Restore construction of neighboring walls	1.00	allow	$ 32,000.00	$ 36,000.00		$ 68,000.00

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												$ -
			02 61 00 Removal and Disposal of Contaminated Soils									$ -
						Monitoring excavation, soil testing, and core drillings	7,600.00	sf		$ 5,000.00		$ 5,000.00
			02 82 13 Asbestos Abatement									$ -
						Asbestos abatement (includes haul to disposal and disposal charge)						$ -
						2nd floor - Exterior door lintel waterproofing flashing (black) and contaminated waterproofing paper (black)	6.00	gsf	$ 300.00	$ 2,000.00		$ 2,300.00
						Main roof - Drain caulking (black)	1.00	gsf	$ 250.00	$ 2,000.00		$ 2,250.00
						Main roof - Door caulking (black)	2.00	gsf	$ 200.00	$ 2,000.00		$ 2,200.00
						Upper roof - Drain Tar (black)	1.00	gsf	$ 250.00	$ 2,000.00		$ 2,250.00
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 131,271.88**	**$ 289,103.00**	**$ 208,103.00**	**$ 628,477.88**
		DIVISION 03 - CONCRETE										
			03 20 00 Concrete Reinforcing									$ -
						Concrete reinforcing						$ -
			03 30 00 Cast-in-Place Concrete									$ -
						Basement						$ -
						Strip footings (Footings; 4.0' x 1'-6" thick,Crushed stone around drainage pipe,Rebar (#8 lbs)Formworks)	102.00	LF	$ 8,000.00	$ 28,000.00	$ 20,000.00	$ 56,000.00
						Strip footings (Footings; 9.5' avg. x 2' thick,Crushed stone around drainage pipe,Rebar (#8 lbs),Crushed stone around drainage pipe,Rebar (#8 lbs) &Formworks)	615.00	SF	$ 12,000.00	$ 110,000.00	$ 40,000.00	$ 162,000.00
						Sloped beam (Footings; 4' x 2' thick,Rebar (#8 lbs)&Formworks)	31.00	LF	$ 5,000.00	$ 20,000.00	$ 4,000.00	$ 29,000.00
						Basement slab(Concrete; 6" thick,Engineered fill ,WWF & Formworks)	6,928.00	SF	$ 40,000.00	$ 190,000.00	$ 8,000.00	$ 238,000.00
						Elevator pit slab (Concrete; 12" thick assume,Rebar #8 - ,Formworks)	105.00	SF	$ 8,000.00	$ 8,000.00	$ 2,000.00	$ 18,000.00
						Elevator pit walls						$ -
						12" Foundation (Concrete wall,Wall rebar (#8),Formworks)	21.00	LF	$ 5,000.00	$ 6,000.00	$ 1,000.00	$ 12,000.00
						Ejector pit slab (Concrete; 6" thick assume,Rebar #8 - &Formworks)	44.00	SF	$ 400.00	$ 4,000.00	$ 600.00	$ 5,000.00
						Ejector pit walls						$ -
						8" Foundation (Concrete wall,Wall rebar (#8)&Formworks)	20.00	LF	$ 900.00	$ 8,000.00	$ 1,600.00	$ 10,500.00
						Spread Footing F6 - 6'-0"-x 6'-0"(Concrete: 1'-6" thick ,Rebar #6 - 4 both ways xTB & Formworks)	180.00	SF	$ 6,000.00	$ 39,000.00	$ 7,000.00	$ 52,000.00
						Spread Footing F7.5 - 7'-6"-x 7'-6"(Concrete: 2'-0" thick ,Rebar #6 - 4 both ways xTB &Formworks)	112.50	SF	$ 4,000.00	$ 31,000.00	$ 5,000.00	$ 40,000.00

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						Spread Footing F8.5 - 8'-6"-x 8'-6"(Concrete: 2'-6" thick ,Rebar #6 - 4 both ways xTB &Formworks)	144.50	SF	$ 7,000.00	$ 32,000.00	$ 7,000.00	$ 46,000.00
						Spread Footing F10x6 - 10'-0"-x 6'-0"(Concrete: 2'-6" thick ,Rebar #6 - 4 both ways xTB &Formworks)	60.00	SF	$ 5,000.00	$ 8,000.00	$ 2,500.00	$ 15,500.00
						Spread Footing Under Detention Tank(Concrete: 2'-0" thick ,Rebar #6 - 4 both ways xTB &Formworks)	129.00	SF	$ 7,000.00	$ 33,000.00	$ 6,000.00	$ 46,000.00
						Foundation walls						$ -
						Foundation walls,16" Foundation (Concrete wall,Concrete wall pilasters,Wall rebar (#5),Column rebar (#5 cage; 125 lbs/cy) (assume),Crushed stone around drainage pipe &Formworks)	**169.00**	**LF**	$ 110,000.00	$ 320,000.00	$ 60,000.00	$ 490,000.00
						1st Floor Slab Edge Curbs(Concrete,Rebar & Formworks)	320.00	LF	$ 2,000.00	$ 8,000.00	$ 4,000.00	$ 14,000.00
						MEP Slab Edge Curbs(Concrete,Rebar & Formworks)	243.00	LF	$ 6,000.00	$ 8,000.00	$ 6,000.00	$ 20,000.00
						Roof Slab Edge Curbs(Concrete,Rebar&Formworks)	403.00	LF	$ 8,000.00	$ 16,000.00	$ 12,000.00	$ 36,000.00
						Detention tank						$ -
						10" Foundation (Concrete wall,Wall rebar (#5),Formworks&Seal tank)	24.00	LF	$ 10,000.00	$ 30,000.00	$ 10,000.00	$ 50,000.00
						Mechanical Pads						$ -
						Concrete Pad (Concrete; 4" thick,6 x 6 WWF & Formworks)	752.00	SF	$ 2,000.00	$ 10,000.00	$ 6,000.00	$ 18,000.00
						Concrete infill on metal deck						$ -
						Entrance slab - 4 1/2" concrete infill w/ #6 @ 12" o.c.T&B	570.00	sf	$ 3,000.00	$ 10,000.00	$ 4,000.00	$ 17,000.00
						1st floor - 2 1/2" concrete infill w/ 6x6 WWF2.1x2.1	5,670.00	sf	$ 80,000.00	$ 110,000.00	$ 56,000.00	$ 246,000.00
						2nd floor - 2 1/2" concrete infill on metal deck w/ 6x6 WWF2.1x2.1	5,060.00	sf	$ 62,000.00	$ 110,000.00	$ 63,000.00	$ 235,000.00
						3rd floor - 2 1/2" concrete infill w/ 6x6 WWF2.1x2.1	1,540.00	sf	$ 55,000.00	$ 120,000.00	$ 69,000.00	$ 244,000.00
						Elevator roof - 2 1/2" concrete infill w/ 6x6 WWF2.1x2.1	110.00	sf	$ 1,500.00	$ 3,000.00	$ 2,000.00	$ 6,500.00
						Roof - 2 1/2" concrete infill on metal deck w/ 6x6 WWF2.1x2.1	5,690.00	sf	$ 20,000.00	$ 136,000.00	$ 12,000.00	$ 168,000.00
												$ -
						Secant pile walls (boring/drilling) (Cement cover - 14'-0" high,6" Concrete wall,6x6/W6 x W6 WWF,Formworks,4'-0" x 4'-0" Concrete grade beam,Rebar (7-#9 top and bottom main bar; #5@12" stirrups) and Formworks)	83.00	ea	$ 65,000.00	$ 83,000.00		$ 148,000.00
						Secant piles - 30"Ø x 22'-6" long (in section 31 60 00)	339.35	cy				$ -
						W14x53 Core beam (at secondary piles) (in section 31 60 00)	24.45	tons				$ -
						Rock socket (in section 31 60 00)	83.00	ea				$ -
						6" Rigid insulation (in section 07 21 00)	2,240.00	sf				$ -

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Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Pile cut-off/spills (in section 31 60 00)	83.00	ea				$ -
						Testing (in section 31 60 00)	83.00	ea				$ -
						Mobilization (in section 31 60 00)	1.00	ea				$ -
						De-mobilization (in section 31 60 00)	1.00	ea				$ -
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 532,800.00**	**$ 1,481,000.00**	**$ 408,700.00**	**$ 2,422,500.00**
		DIVISION 04 - MASONRY										
			04 20 00 Unit Masonry									$ -
						Wall Type 3						$ -
						6" Masonry wall	1,215.00	sf	$ 9,720.00	$ 34,020.00		$ 43,740.00
						4" Semi-rigid insulation (in section 07 21 00)	1,215.00	sf	$ 4,856.00	$ 4,856.00		$ 9,712.00
						Polymer modified cement waterproofing (in section 07 16 13)	1,215.00	sf	$ 2,430.00	$ 6,075.00		$ 8,505.00
			04 21 13.23 Surface-Bonded Brick Masonry									$ -
						Wall Type 1 (Exterior)						$ -
						Glazed brick w/control joints, z-furring and SS masonry anchors	9,014.00	sf	$ 200,350.00	$ 400,700.00		$ 601,050.00
						Ribs w/premium for labor to install	1,010.00	lf		$ 25,000.00		$ 25,000.00
						Corners w/premium for labor to install	243.00	lf		$ 6,014.25		$ 6,014.25
						4" Semi-rigid insulation (in section 07 21 00)	9,014.00	sf	$ 18,028.00	$ 18,028.00		$ 36,056.00
						Air barrier (in section 07 27 26)	9,014.00	sf				$ -
						6" Metal Stud; 16" O.C, w/gypsum sheathing (in section 05 41 00)	9,014.00	sf				$ -
						6" Mineral wool (in section 07 21 00)	9,014.00	sf				$ -
						Relieving angle w/thermal lintel bracket	60.00	lf	$ 500.00	$ 6,000.00		$ 6,500.00
												$ -
						Wall Type 2 (Exterior)						$ -
						Glazed brick w/control joints, z-furring and SS masonry anchors (includes two sides)	2,740.00	sf	$ 68,500.00	$ 137,000.00		$ 205,500.00
						Air barrier (includes two sides (in section 07 27 26)	2,740.00	sf				$ -
						6" Metal Stud; 16" O.C, w/(2) layers gypsum sheathing (includes two sides) (in section 05 41 00)	2,740.00	sf				$ -

Department of Design and Construction

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												$ -
						Glazed Thin Brick	4,755.00	sf				$ -
						C04 Lobby	3,829.00		$ 95,725.00	$ 153,160.00		$ 248,885.00
						101 Vestibule	312.00		$ 7,800.00	$ 12,480.00		$ 20,280.00
						206 Multipurpose Room	614.00		$ 15,350.00	$ 24,560.00		$ 39,910.00
												$ -
						Upgrade Lobby brick wall to accommodate Artwork						$ -
						Glazed Thin Brick	(1,926.00)	sf	$ (48,150.00)	$ (96,300.00)		$ (144,450.00)
						C04 Lobby (full depth brick at art work walls)	1,926.00	sf	$ 34,668.00	$ 80,892.00		$ 115,560.00
						Please be advised, premium for special art brick and any premium for labor to layout, supervision and placing special art brick not included.						$ -
						Upgrade to substrate	1,926.00	sf	$ 101,000.00	$ 66,000.00		$ 167,000.00
						Special art bricks	2,280.00	ea	$ 50,000.00	$ 18,000.00		$ 68,000.00
						Structural angle	0.34	tons	$ 7,140.00	$ 3,060.00		$ 10,200.00
			04 42 00 Exterior Stone Cladding									$ -
						Stone base panels	220.00	sf	$ 22,000.00	$ 28,000.00		$ 50,000.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 589,917.00**	**$ 927,545.25**		**$ 1,517,462.25**
		DIVISION 05 - METALS										
			05 12 00 Structural Steel Framing									$ -
						Structural steel framing (fireproof with shear studs)						$ -
						Cellar floor level						$ -
						W10 x 54 - column	1.67	tons	$ 2,204.40	$ 7,439.00	$ 2,500.00	$ 12,143.40
						W10 x 77 - column	1.19	tons	$ 1,570.80	$ 5,301.45	$ 2,600.00	$ 9,472.25
						W10 x 112 - column	1.74	tons	$ 2,296.80	$ 7,751.70	$ 2,800.00	$ 12,848.50
						Baseplates - 1'-6" x 1'-6" x 3/4" thick	0.27	tons	$ 356.40	$ 1,202.85	$ 49.68	$ 1,608.93
						First Floor level						$ -
						W6 x 20	0.10	tons	$ 132.00	$ 445.50	$ 18.40	$ 595.90

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						W10 x 19	0.20	tons	$ 264.00	$ 891.00	$ 36.80	$ 1,191.80
						W10 x 45	0.32	tons	$ 409.2	$ 1,381.05	$ 57.04	$ 1,847.29
						W12 x 19	0.81	tons	$ 1,069.20	$ 3,608.55	$ 149.04	$ 4,826.79
						W12 x 26	0.18	tons	$ 237.60	$ 801.90	$ 33.12	$ 1,072.62
						W12 x 45	0.59	tons	$ 778.80	$ 2,628.45	$ 108.56	$ 3,515.81
						W14 x 22	3.03	tons	$ 3,999.60	$ 13,498.65	$ 557.52	$ 18,055.77
						W14 x 30	0.90	tons	$ 1,188.00	$ 4,009.50	$ 165.60	$ 5,363.10
						W14 x 38	1.08	tons	$ 1,425.60	$ 4,811.40	$ 198.72	$ 6,435.72
						W14 x 43	3.61	tons	$ 4,765.20	$ 16,082.55	$ 664.24	$ 21,511.99
						W14 x 53	2.15	tons	$ 2,838.00	$ 9,578.25	$ 395.60	$ 12,811.85
						W14 x 59	0.65	tons	$ 858.00	$ 2,895.75	$ 119.60	$ 3,873.35
						W14 x 61	0.70	tons	$ 924.00	$ 3,118.50	$ 128.80	$ 4,171.30
						W14 x 68	0.78	tons	$ 1,029.60	$ 3,474.90	$ 143.52	$ 4,648.02
						W14 x 82	0.94	tons	$ 1,240.80	$ 4,187.70	$ 172.96	$ 5,601.46
						W18 x 46	0.55	tons	$ 726.00	$ 2,450.25	$ 1,000.00	$ 4,176.25
						W18 x 50	1.20	tons	$ 1,584.00	$ 5,346.00	$ 1,500.00	$ 8,430.00
						W21 x 55	0.66	tons	$ 871.20	$ 2,940.30	$ 2,000.00	$ 5,811.50
						W24 x 55	1.93	tons	$ 2,547.60	$ 8,598.15	$ 2,000.00	$ 13,145.75
						W24 x 62	0.74	tons	$ 976.80	$ 3,296.70	$ 2,100.00	$ 6,373.50
						W24 x 68	0.99	tons	$ 1,306.80	$ 4,410.45	$ 2,200.00	$ 7,917.25
						W30 x 124	3.47	tons	$ 10,410.00	$ 15,458.85	$ 4,500.00	$ 30,368.85
						W36 x 194	4.07	tons	$ 12,210.00	$ 18,131.85	$ 5,500.00	$ 35,841.85
						HSS10 x 3 x5/16	0.13	tons	$ 171.60	$ 579.15	$ 23.92	$ 774.67
						W10 x 54 - column	4.37	tons	$ 5,768.40	$ 19,468.35	$ 804.08	$ 26,040.83
						W10 x 77 - column	1.16	tons	$ 1,531.20	$ 5,167.80	$ 213.44	$ 6,912.44
						W10 x 112 - column	1.68	tons	$ 2,217.60	$ 7,484.40	$ 309.12	$ 10,011.12

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						HSS10 x 4 x 1/2 - post (1ea) - 14'-8" high	0.31	tons	$ 409.20	$ 1,381.05	$ 57.04	$ 1,847.29
						4" x 11" Plate (grade 50, AESS) - column (5 loc)	6.04	tons	$ 7,972.80	$ 26,908.20	$ 1,111.36	$ 35,992.36
						Moment Connections	17.00	ea	$ 22,440.00	$ 75,735.00	$ 3,128.00	$ 101,303.00
						Baseplates - 1'-6" x 1'-6" x 3/4" thick	0.27	tons	$ 356.40	$ 1,202.85	$ 49.68	$ 1,608.93
						Bearing plates	0.05	tons	$ 66.00	$ 222.75	$ 9.20	$ 297.95
						Wall plates - assume 1'-6" x 1'-6" x 3/4" thick	0.95	tons	$ 1,254.00	$ 4,232.25	$ 174.80	$ 5,661.05
						2"Ø penetration at bottom of column - allow	5.00	ea	$ 6,600.00	$ 22,275.00	$ 920.00	$ 29,795.00
						Web penetration (reinforced)	5.00	ea	$ 6,600.00	$ 22,275.00	$ 920.00	$ 29,795.00
						HSS9 x 3 x 3/8 sill beam	0.56	tons	$ 739.20	$ 2,494.80	$ 103.04	$ 3,337.04
						HSS6 x 3 x 3/8 above and below	0.22	tons	$ 290.40	$ 980.10	$ 40.48	$ 1,310.98
						HSS6 x 3 x 1/2 sill support posts, 2'-10" high	0.28	tons	$ 369.60	$ 1,247.40	$ 51.52	$ 1,668.52
						HSS10 x 3 x3/8 above and below	0.68	tons	$ 897.60	$ 3,029.40	$ 125.12	$ 4,052.12
						3/8" rod hangers below at stair landing	0.66	tons	$ 871.20	$ 2,940.30	$ 121.44	$ 3,932.94
						2nd Floor level						$ -
						W6 x 20	0.10	tons	$ 132.00	$ 445.50	$ 285.00	$ 862.50
						W10 x 19	0.46	tons	$ 607.20	$ 2,049.30	$ 358.00	$ 3,014.50
						W12 x 19	0.67	tons	$ 884.40	$ 2,984.85	$ 427.00	$ 4,296.25
						W14 x 22	3.52	tons	$ 4,646.40	$ 15,681.60	$ 647.68	$ 20,975.68
						W14 x 30	1.32	tons	$ 1,742.40	$ 5,880.60	$ 242.88	$ 7,865.88
						W14 x 34	1.72	tons	$ 2,270.40	$ 7,662.60	$ 316.48	$ 10,249.48
						W14 x 38	1.63	tons	$ 2,151.60	$ 7,261.65	$ 299.92	$ 9,713.17
						W14 x 48	0.60	tons	$ 792.00	$ 2,673.00	$ 450.00	$ 3,915.00
						W14 x 61	1.43	tons	$ 1,887.60	$ 6,370.65	$ 463.00	$ 8,721.25
						W14 x 82	1.07	tons	$ 1,412.40	$ 4,766.85	$ 472.00	$ 6,651.25
						W16 x 26	0.49	tons	$ 646.80	$ 2,182.95	$ 394.00	$ 3,223.75
						W18 x 35	0.68	tons	$ 897.60	$ 3,029.40	$ 395.00	$ 4,322.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						W18 x 40	0.84	tons	$ 1,108.80	$ 3,742.20	$ 384.00	$ 5,235.00
						W18 x 60	0.60	tons	$ 792.00	$ 2,673.00	$ 381.00	$ 3,846.00
						W21 x 44	1.58	tons	$ 2,085.60	$ 7,038.90	$ 1,184.00	$ 10,308.50
						W21 x 50	1.18	tons	$ 1,557.60	$ 5,256.90	$ 1,200.00	$ 8,014.50
						W21 x 57	0.77	tons	$ 1,016.40	$ 3,430.35	$ 1,354.00	$ 5,800.75
						W21 x 68	0.65	tons	$ 858.00	$ 2,895.75	$ 1,400.00	$ 5,153.75
						W24 x 55	0.69	tons	$ 910.80	$ 3,073.95	$ 1,523.00	$ 5,507.75
						W24 x 62	0.84	tons	$ 1,108.80	$ 3,742.20	$ 1,553.00	$ 6,404.00
						W24 x 68	0.61	tons	$ 805.20	$ 2,717.55	$ 1,653.00	$ 5,175.75
						W24 x 76	1.18	tons	$ 1,557.60	$ 5,256.90	$ 1,596.00	$ 8,410.50
						W30 x 116	3.65	tons	$ 4,818.00	$ 16,260.75	$ 4,506.00	$ 25,584.75
						W33 x 118	2.48	tons	$ 3,273.60	$ 11,048.40	$ 4,506.00	$ 18,828.00
						HSS8 x 6 x3/8	0.10	tons	$ 132.00	$ 445.50	$ 452.00	$ 1,029.50
						HSS10 x 3 x5/16	0.13	tons	$ 171.60	$ 579.15	$ 658.00	$ 1,408.75
						HSS14 x 6 x 1/2 - 2nd floor stair 1 landing	0.50	tons	$ 660.00	$ 2,227.50	$ 951.00	$ 3,838.50
						W10 x 54 - column	4.40	tons	$ 5,808.00	$ 19,602.00	$ 809.60	$ 26,219.60
						W10 x 77 - column	1.08	tons	$ 1,425.60	$ 4,811.40	$ 457.00	$ 6,694.00
						W10 x 112 - column	2.97	tons	$ 3,920.40	$ 13,231.35	$ 546.48	$ 17,698.23
						HSS5 x 5 x 3/8 - hanger	0.02	tons	$ 26.40	$ 89.10	$ 354.00	$ 469.50
						Moment Connections	21.00	ea	$ 27,720.00	$ 93,555.00	$ 7,830.00	$ 129,105.00
						HSS9 x 3 x 3/8 sill beam	0.70	tons	$ 924.00	$ 3,118.50	$ 956.00	$ 4,998.50
						HSS6 x 3 x 1/2 sill support posts, 2'-10" high	0.35	tons	$ 462.00	$ 1,559.25	$ 952.00	$ 2,973.25
						HSS6 x 3 x 3/8 above and below	0.22	tons	$ 290.40	$ 980.10	$ 726.00	$ 1,996.50
						HSS4 x 3 x 3/8 hanger below, 11'-10" high	0.44	tons	$ 580.80	$ 1,960.20	$ 651.00	$ 3,192.00
						HSS5 x 5 x 3/8 hanger below, 11'-10" high	0.28	tons	$ 369.60	$ 1,247.40	$ 658.00	$ 2,275.00
						HSS8 x 4 x 3/8 posts	0.20	tons	$ 264.00	$ 891.00	$ 648.00	$ 1,803.00

Department of Design and Construction

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						HSS10 x 3 x3/8 above and below	0.68	tons	$ 897.60	$ 3,029.40	$ 957.00	$ 4,884.00
						L3 x 3 x 3/8 kicker	0.08	tons	$ 105.60	$ 356.40	$ 348.00	$ 810.00
						3/8" rod hangers below at stair landing	0.06	tons	$ 79.20	$ 267.30	$ 2,600.00	$ 2,946.50
						Web penetration (reinforced)	1.00	ea	$ 1,320.00	$ 4,455.00	$ 582.00	$ 6,357.00
						3rd Floor (MECH) level						$ -
						W10 x 19	0.65	tons	$ 858.00	$ 2,895.75	$ 446.00	$ 4,199.75
						W10 x 22	0.24	tons	$ 316.80	$ 1,069.20	$ 587.00	$ 1,973.00
						W12 x 19	0.15	tons	$ 198.00	$ 668.25	$ 450.00	$ 1,316.25
						W14 x 22	0.39	tons	$ 514.80	$ 1,737.45	$ 385.00	$ 2,637.25
						W14 x 30	0.27	tons	$ 356.40	$ 1,202.85	$ 456.00	$ 2,015.25
						W14 x 34	0.51	tons	$ 673.20	$ 2,272.05	$ 652.00	$ 3,597.25
						W14 x 82	1.64	tons	$ 2,164.80	$ 7,306.20	$ 754.00	$ 10,225.00
						W14 x 90	1.40	tons	$ 1,848.00	$ 6,237.00	$ 732.00	$ 8,817.00
						W16 x 26	0.34	tons	$ 448.80	$ 1,514.70	$ 568.00	$ 2,531.50
						W18 x 35	0.40	tons	$ 528.00	$ 1,782.00	$ 650.00	$ 2,960.00
						W18 x 40	0.76	tons	$ 1,003.20	$ 3,385.80	$ 1,000.00	$ 5,389.00
						W18 x 50	0.63	tons	$ 831.60	$ 2,806.65	$ 1,500.00	$ 5,138.25
						W18 x 86	1.16	tons	$ 1,531.20	$ 5,167.80	$ 2,500.00	$ 9,199.00
						W21 x 57	0.74	tons	$ 976.80	$ 3,296.70	$ 1,200.00	$ 5,473.50
						W24 x 62	0.90	tons	$ 1,188.00	$ 4,009.50	$ 2,500.00	$ 7,697.50
						W24 x 76	3.42	tons	$ 4,514.40	$ 15,236.10	$ 4,800.00	$ 24,550.50
						HSS12 x 6 x 3/8	0.36	tons	$ 475.20	$ 1,603.80	$ 950.00	$ 3,029.00
						HSS12 x 6 x 3/8 - header	0.41	tons	$ 541.20	$ 1,826.55	$ 950.00	$ 3,317.75
						W10 x 54 - column	2.73	tons	$ 3,603.60	$ 12,162.15	$ 3,800.00	$ 19,565.75
						W10 x 77 - column	0.85	tons	$ 1,122.00	$ 3,786.75	$ 1,500.00	$ 6,408.75
						W10 x 112 - column	0.62	tons	$ 818.40	$ 2,762.10	$ 1,800.00	$ 5,380.50

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						HSS12 x 6 x 3/8 post, 10'-6" high	0.22	tons	$ 290.40	$ 980.10	$ 950.00	$ 2,220.50
						HSS6 x 3 x 3/8 - post, 9'-0" high	0.09	tons	$ 118.80	$ 400.95	$ 375.00	$ 894.75
						HSS6 x 4 x 1/2 - post, 3'-0" high	0.26	tons	$ 343.20	$ 1,158.30	$ 475.00	$ 1,976.50
						HSS6 x 6 x 3/8 - post, 9'-0" high	0.25	tons	$ 330.00	$ 1,113.75	$ 425.00	$ 1,868.75
						Moment Connections	6.00	ea	$ 7,920.00	$ 26,730.00	$ 1,850.00	$ 36,500.00
						AHU & Elevator roof level						$ -
						W08 x 18	0.20	tons	$ 264.00	$ 891.00	$ 950.00	$ 2,105.00
						W08 x 28 - hoist beam	0.11	tons	$ 145.20	$ 490.05	$ 750.00	$ 1,385.25
						W10 x 19	0.20	tons	$ 264.00	$ 891.00	$ 650.00	$ 1,805.00
						HSS6 x 6 x 3/8	0.87	tons	$ 1,148.40	$ 3,875.85	$ 1,500.00	$ 6,524.25
						Moment Connections	6.00	ea	$ 7,920.00	$ 26,730.00	$ 1,104.00	$ 35,754.00
						Roof level						$ -
						W10 x 19	1.43	tons	$ 1,887.60	$ 6,370.65	$ 685.00	$ 8,943.25
						W14 x 22	2.20	tons	$ 2,904.00	$ 9,801.00	$ 2,600.00	$ 15,305.00
						W14 x 30	2.58	tons	$ 3,405.60	$ 11,493.90	$ 2,700.00	$ 17,599.50
						W14 x 38	0.38	tons	$ 501.60	$ 1,692.90	$ 3,800.00	$ 5,994.50
						W14 x 53 - bent	1.75	tons	$ 2,310.00	$ 7,796.25	$ 3,700.00	$ 13,806.25
						W14 x 53	0.72	tons	$ 950.40	$ 3,207.60	$ 3,700.00	$ 7,858.00
						W14 x 61	2.81	tons	$ 3,709.20	$ 12,518.55	$ 3,800.00	$ 20,027.75
						W18 x 35	1.84	tons	$ 2,428.80	$ 8,197.20	$ 2,700.00	$ 13,326.00
						W18 x 50	0.50	tons	$ 660.00	$ 2,227.50	$ 900.00	$ 3,787.50
						W18 x 71	1.10	tons	$ 1,452.00	$ 4,900.50	$ 1,200.00	$ 7,552.50
						W21 x 44	2.66	tons	$ 3,511.20	$ 11,850.30	$ 1,500.00	$ 16,861.50
						W21 x 55	0.83	tons	$ 1,095.60	$ 3,697.65	$ 2,100.00	$ 6,893.25
						W24 x 55	0.69	tons	$ 910.80	$ 3,073.95	$ 2,100.00	$ 6,084.75
						W24 x 55 - bent	0.85	tons	$ 1,122.00	$ 3,786.75	$ 2,100.00	$ 7,008.75

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						W24 x 62	1.55	tons	$ 2,046.00	$ 6,905.25	$ 2,100.00	$ 11,051.25
						W24 x 76	0.76	tons	$ 1,003.20	$ 3,385.80	$ 2,500.00	$ 6,889.00
						W24 x 117	2.46	tons	$ 7,380.00	$ 10,959.30	$ 3,000.00	$ 21,339.30
						W30 x 90	1.80	tons	$ 5,400.00	$ 8,019.00	$ 2,600.00	$ 16,019.00
						W30 x 124	5.64	tons	$ 16,920.00	$ 25,126.20	$ 4,800.00	$ 46,846.20
						HSS12 x 6 x 3/8 header	0.56	tons	$ 739.20	$ 2,494.80	$ 2,500.00	$ 5,734.00
						HSS14 x 10 x 5/16	1.95	tons	$ 2,574.00	$ 8,687.25	$ 2,700.00	$ 13,961.25
						HSS9 x 3 x 3/8 header below	0.76	tons	$ 1,003.20	$ 3,385.80	$ 1,500.00	$ 5,889.00
						HSS4 x 3 x 3/8 hanger below, 3'-6" high	0.13	tons	$ 171.60	$ 579.15	$ 500.00	$ 1,250.75
						HSS5 x 5 x 3/8 hanger below to 2nd floor	0.16	tons	$ 211.20	$ 712.80	$ 400.00	$ 1,324.00
						L3 x 3 x 3/8 kicker	0.06	tons	$ 79.20	$ 267.30	$ 350.00	$ 696.50
						Moment Connections	21.00	ea	$ 27,720.00	$ 93,555.00	$ 3,864.00	$ 125,139.00
						Web penetration (reinforced)	3.00	ea	$ 3,960.00	$ 13,365.00	$ 2,700.00	$ 20,025.00
						Lateral Bracing - Gridline 1						$ -
						HSS6 x 6 x 3/8	4.44	tons	$ 5,860.80	$ 19,780.20	$ 3,500.00	$ 29,141.00
						Lateral Bracing - Gridline A						$ -
						HSS6 x 6 x 1/2	0.63	tons	$ 831.60	$ 2,806.65	$ 850.00	$ 4,488.25
						HSS8 x 8 x 3/8	0.40	tons	$ 528.00	$ 1,782.00	$ 1,500.00	$ 3,810.00
						Lateral Bracing - Gridline D						$ -
						HSS6 x 6 x 3/8	4.07	tons	$ 5,372.40	$ 18,131.85	$ 3,800.00	$ 27,304.25
												$ -
						Standard connections; 10%	15.93	ton	$ 21,021.02	$ 70,945.94	$ 15,000.00	$ 106,966.95
												$ -
						Steel dunnage (includes steel bracketry, wall mounted support)	2.00	tons	$ 2,640.00	$ 8,910.00	$ 4,500.00	$ 16,050.00
			05 12 13 Architecturally-Exposed Structural Steel Framing									$ -
						Terrazzo; metal pan egress stairs, northeast corner						$ -

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						Monumental Stairs ST1, AESS						$ -
						Stringer S1 (AESS)	5.41	tons	$ 8,125.94	$ 12,188.92	$ 2,500.00	$ 22,814.86
						Stringer S2 (AESS)	0.68	tons	$ 1,485.39	$ 2,228.08	$ 3,500.00	$ 7,213.47
						Stringer S3 (AESS)	5.13	tons	$ 8,125.94	$ 12,188.92	$ 4,500.00	$ 24,814.86
						Stringer S4 (AESS)	0.73	tons	$ 2,538.06	$ 3,807.09	$ 3,500.00	$ 9,845.14
						Tread (AESS) - 1/2" x 9"	2.00	tons	$ 15,756.59	$ 35,360.00	$ 19,984.00	$ 71,100.59
						Riser (AESS) - 1/2" x 3"	0.67	tons	$ 8,878.30	$ 17,680.00	$ 9,992.00	$ 36,550.30
						Standard connections; 10%	1.46	ton	$ 2,800.00	$ 4,500.00	$ 1,500.00	$ 8,800.00
			05 31 00 Steel Decking									$ -
						Structural Decking						$ -
						Entrance Slab						$ -
						3" steel pan	570.00	sf	$ 1,710.00	$ 3,990.00		$ 5,700.00
						4 1/2" concrete infill on metal deck w/ #6 @ 12" o.c.T&B (in section 03 03 00)	570.00	sf				$ -
						Fireproofing on metal decking (in section 07 80 00)	570.00	sf				$ -
						1st Floor						$ -
						3" steel pan	5,670.00	sf	$ 17,010.00	$ 39,690.00		$ 56,700.00
						2 1/2" concrete infill on metal deck w/ 6x6 WWF2.1x2.1 (in section 03 03 00)	5,670.00	sf				$ -
						Fire proofing on metal decking (in section 07 80 00)	5,670.00	sf				$ -
						2nd Floor						$ -
						3" steel pan	5,060.00	sf	$ 15,180.00	$ 35,420.00		$ 50,600.00
						2 1/2" concrete infill on metal deck w/ 6x6 WWF2.1x2.1 (in section 03 03 00)	5,060.00	sf				$ -
						Fire proofing on metal decking (in section 07 80 00)	5,060.00	sf				$ -
						3rd Floor (Mech)						$ -
						3" steel pan	1,540.00	sf	$ 4,620.00	$ 10,780.00		$ 15,400.00
						2 1/2" concrete infill on metal deck w/ 6x6 WWF2.1x2.1 (in section 03 03 00)	1,540.00	sf				$ -
						Fire proofing on metal decking (in section 07 80 00)	1,540.00	sf				$ -

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						Elevator roof						$ -
						3" steel pan	110.00	sf	$ 330.00	$ 770.00		$ 1,100.00
						2 1/2" concrete infill on metal deck w/ 6x6 WWF2.1x2.1 (in section 03 03 00)	110.00	sf				$ -
						Fire proofing on metal decking (in section 07 80 00)	110.00	sf				$ -
						Roof						$ -
						3" steel pan	5,690.00	sf	$ 17,070.00	$ 39,830.00		$ 56,900.00
						2 1/2" concrete infill on metal deck w/ 6x6 WWF2.1x2.1 (in section 03 03 00)	5,690.00	sf				$ -
						Fire proofing on metal decking (in section 07 80 00)	5,690.00	sf				$ -
			05 40 00 Cold-Formed Metal Framing									$ -
						Exterior non-load bearing wall framing, soffit framing (Included in section 09 29 00)						$ -
			05 50 00 Metal Fabrications									$ -
						Façade girt steel	2,136.00	sf				$ -
						AHU & Elevator roof level						$ -
						3/16" x 1 1/2" Galvanized bar grating	131.00	sf	$ 17,536.02	$ 14,188.42	$ 2,294.90	$ 34,019.34
												$ -
						SS gate at roof	1.00	ea	$ 3,580.00	$ 2,500.00	$ 1,500.00	$ 7,580.00
												$ -
						Catwalk structure (Detail 5, 6, 7, 8/A205)	153.00	sf				$ -
						Guardrail	94.00	lf	$ 1,203.65	$ 5,593.44	$ 9,000.00	$ 15,797.09
						Ladder	28.00	lf	$ 2,564.00	$ 2,456.00	$ 2,500.00	$ 7,520.00
						42" high SS steel railings/guardrail on roof	291.00	lf	$ 55,880.77	$ 64,486.67	$ 9,000.00	$ 129,367.45
			05 51 13 Metal Pan Stairs									$ -
						Concrete; metal pan egress stairs, northeast corner						$ -
						Level C to Level 1 - ST3						$ -
						Stair run	24.00	risers	$ 4,500.00	$ 2,500.00	$ 1,000.00	$ 8,000.00
						Landings mid way	20.00	sf	$ 2,400.00	$ 1,600.00	$ 850.00	$ 4,850.00

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						Steel railing, wall mounted (In section 05 52 00)	56.00	lf				$ -
						Level C to Level 1 - ST2						$ -
						Stair run	24.00	risers	$ 3,500.00	$ 1,500.00	$ 1,500.00	$ -
						Landings mid way	73.00	sf	$ 2,500.00	$ 1,000.00	$ 1,000.00	$ -
						Painted steel guardrail and handrail (In section 05 52 00)	24.00	lf				$ -
						Steel railing, wall mounted (In section 05 52 00)	27.00	lf				$ -
						Level 1 to Level 2 - ST2						$ -
						Stair run	26.00	risers	$ 2,500.00	$ 1,500.00	$ 1,000.00	$ -
						Landings mid way	66.00	sf	$ 1,300.00	$ 1,500.00	$ 580.00	$ 3,380.00
						Painted steel guardrail and handrail (In section 05 52 00)	44.00	lf				$ -
						Steel railing, wall mounted (In section 05 52 00)	23.00	lf				$ -
						HSS8 x 4 x 3/8 - stair post (1ea), 14'-8" high	0.20	tons	$ 1,500.00	$ 1,800.00	$ 800.00	$ 4,100.00
						Level 2 to Level 3 - ST2						$ -
						Stair run	22.00	risers	$ 1,500.00	$ 1,000.00	$ 1,000.00	$ 3,500.00
						Landings mid way	44.00	sf	$ 3,000.00	$ 1,500.00	$ 500.00	$ -
						Painted steel guardrail and handrail (In section 05 52 00)	36.00	lf				$ -
						Steel railing, wall mounted (In section 05 52 00)	31.00	lf				$ -
						HSS8 x 4 x 3/8 - stair post (1ea), 13'-4" high	0.18	tons	$ 1,500.00	$ 750.00	$ 1,000.00	$ 3,250.00
						Level 1 to Level 2 ST4						$ -
						Stair run	26.00	risers	$ 1,500.00	$ 1,000.00	$ 650.00	$ 3,150.00
						Landings mid way	12.00	sf	$ 2,500.00	$ 2,500.00	$ 1,000.00	$ 6,000.00
						Steel railing, wall mounted (In section 05 52 00)	54.00	lf				$ -
			05 52 00 Metal Railings									$ -
						Concrete; metal pan egress stairs, northeast corner						$ -
						Level C to Level 1 - ST3						$ -
						Steel railing, wall mounted	56.00	lf	$ 4,500.00	$ 2,500.00	$ 1,000.00	$ 8,000.00

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Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Level C to Level 1 - ST2						$ -
						Painted steel guardrail and handrail	24.00	lf	$ 1,500.00	$ 2,450.00	$ 1,000.00	$ 4,950.00
						Steel railing, wall mounted	27.00	lf	$ 2,745.00	$ 3,500.00	$ 1,000.00	$ 7,245.00
						Level 1 to Level 2 - ST2						$ -
						Painted steel guardrail and handrail	44.00	lf	$ 2,450.00	$ 2,500.00	$ 1,500.00	$ 6,450.00
						Steel railing, wall mounted	23.00	lf	$ 2,548.00	$ 2,450.00	$ 1,800.00	$ 6,798.00
						Level 2 to Level 3 - ST2						$ -
						Painted steel guardrail and handrail	36.00	lf	$ 2,340.00	$ 2,480.00	$ 1,450.00	$ 6,270.00
						Steel railing, wall mounted	31.00	lf	$ 4,502.00	$ 1,500.00	$ 1,400.00	$ 7,402.00
						Level 1 to Level 2 ST4						$ -
						Steel railing, wall mounted	54.00	lf	$ 4,500.00	$ 3,500.00	$ 3,500.00	$ 11,500.00
			05 70 00 Decorative Metal									$ -
						Custom Metal Jamb and Header Surround into (104-102-103))(204-202-203)(C06-C02-C03)	1,200.00	sf				$ -
			05 71 00 Decorative Metal Stairs									$ -
						Monumental Stairs ST1, AESS						$ -
						Stair run - precast terrazzo trread & riser on mortar bed	58.00	risers	$ 55,000.00	$ 2,500.00	$ 10,000.00	$ 67,500.00
						Landings mid way	160.00	sf	$ 28,000.00	$ 13,000.00	$ 6,500.00	$ 47,500.00
						3/8" abrasive nosing strip	321.00	lf				$ -
						42" Glass guard rail (In section 05 73 13)	72.00	lf	$ 35,000.00	$ 19,800.00	$ 3,500.00	$ 58,300.00
						1 3/4" x 1/2" painted steel bar handrail support	147.00	lf	$ 12,000.00	$ 9,800.00	$ 3,500.00	$ 25,300.00
						Wood handrail	147.00	lf	$ 2,940.00	$ 2,200.00		$ 5,140.00
						Stringer S1 (AESS) (in section 05 12 13)						$ -
						Stringer S2 (AESS) (in section 05 12 13)						$ -
						Stringer S3 (AESS) (in section 05 12 13)						$ -
						Stringer S4 (AESS) (in section 05 12 13)						$ -
						Tread (AESS) - 1/2" x 9" (in section 05 12 13)						$ -

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Riser (AESS) - 1/2" x 3" (in section 05 12 13)						$ -
						HSS6 x 6 x 1/2 - stair post(4ea), 4'-0" high, cellar	0.28	tons	$ 2,580.00	$ 1,800.00	$ 1,500.00	$ 5,880.00
						HSS6 x 6 x 1/2 - stair post (2ea), 14'-8" high, 1st flr	0.52	tons	$ 3,548.00	$ 1,200.00	$ 1,000.00	$ 5,748.00
						HSS6 x 6 x 1/2 landing beam-cellar	0.37	tons	$ 2,500.00	$ 1,400.00	$ 1,500.00	$ 5,400.00
						HSS6 x 6 x 3/8 landing beam-between 1st & 2nd floor	0.15	tons	$ 2,500.00	$ 1,500.00	$ 1,000.00	$ 5,000.00
						5/8" thick steel plate - landing, between 1st & 2nd floor	1.03	tons	$ 2,500.00	$ 1,500.00	$ 4,500.00	$ 8,500.00
						Standard connections; 10%	0.23	ton	$ 4,500.00	$ 2,500.00	$ 1,500.00	$ 8,500.00
			05 73 00 Decorative Metal Railings									$ -
						Decorative metal railings (Included in section 05 71 00)			$ 66,440.95	$ 35,000.00	$ 35,000.00	$ 136,440.95
						Monumental Stairs ST1, AESS						$ -
						42" Glass guard rail	72.00	lf	$ 21,600.00	$ 12,600.00		$ 34,200.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 852,251.24**	**$ 1,619,788.22**	**$ 379,247.38**	**$ 2,830,286.83**
		DIVISION 06 - WOOD, PLASTICS, COMPOSITES										
			06 10 00 Rough Carpentry									$ -
						Blocking, Miscellaneous framing	18,588.00	gsf	$ 60,000.00	$ 45,000.00		$ 105,000.00
			06 16 00 Sheathing									$ -
						Load bearing metal stud framing, 6" at exterior wall						$ -
						Wall Type 1						$ -
						Gypsum sheathing	9,014.00	sf	$ 180,280.00	$ 198,308.00		$ 378,588.00
						Wall Type 2						$ -
						Two (2) layers gypsum sheathing (includes two sides)	2,740.00	sf	$ 54,800.00	$ 60,280.00		$ 115,080.00
			06 40 23 Interior Architectural Woodwork									$ -
						Misc. Finish carpentry - wall boards, closet storage, elevator, etc	18,588.00	sf	$ 111,528.00	$ 130,116.00		$ 241,644.00
												$ -
						Painted Wood Base	945.00	lf				$ -
						106	19.00		$ 190.00	$ 190.00		$ 380.00

Department of Design and Construction

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Hard Cost Estimate (Level 2)

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						107	78.00		$ 780.00	$ 780.00		$ 1,560.00
						108	122.00		$ 1,220.00	$ 1,220.00		$ 2,440.00
						112	64.00		$ 640.00	$ 640.00		$ 1,280.00
						113	88.00		$ 880.00	$ 880.00		$ 1,760.00
						207	108.00		$ 1,080.00	$ 1,080.00		$ 2,160.00
						208	29.00		$ 290.00	$ 290.00		$ 580.00
						211	31.00		$ 310.00	$ 310.00		$ 620.00
						C01	374.00		$ 3,740.00	$ 3,740.00		$ 7,480.00
						C02	6.00		$ 60.00	$ 60.00		$ 120.00
						C03	26.00		$ 260.00	$ 260.00		$ 520.00
						Wood Base	2,653.00	lf				$ -
						C05	567.00		$ 8,505.00	$ 5,670.00		$ 14,175.00
						C06	81.00		$ 1,215.00	$ 810.00		$ 2,025.00
						C07	119.00		$ 1,785.00	$ 1,190.00		$ 2,975.00
						103	821.00		$ 12,315.00	$ 8,210.00		$ 20,525.00
						104	97.00		$ 1,455.00	$ 970.00		$ 2,425.00
						201	686.00		$ 10,290.00	$ 6,860.00		$ 17,150.00
						202	121.00		$ 1,815.00	$ 1,210.00		$ 3,025.00
						204	132.00		$ 1,980.00	$ 1,320.00		$ 3,300.00
						205	29.00		$ 435.00	$ 290.00		$ 725.00
						C01 Multipurpose Room						$ -
						Millwork wall panel w/furring	345.00	sf	$ 1,725.00	$ 3,450.00		$ 5,175.00
						C06 Quiet Room						$ -
						Millwork wall panel w/furring	257.00	sf	$ 9,625.00	$ 9,625.00		$ 19,250.00
						C05 Teen Reading Room						$ -
						Millwork wall panel w/furring	1,876.00	sf	$ 9,380.00	$ 7,504.00		$ 16,884.00

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						Acoustic panel premium	605.00	sf	$ 27,225.00	$ 21,175.00		$ 48,400.00
						Librarian circulation desk	17.00	lf	$ 23,800.00	$ 10,500.00		$ 34,300.00
						Public computer station	37.00	lf	$ 51,000.00	$ 22,000.00		$ 73,000.00
						C07 Corridor						$ -
						Built-in shelving	4.00	lf	$ 3,200.00	$ 1,600.00		$ 4,800.00
						Millwork wall panel w/furring	604.00	sf	$ 3,000.00	$ 6,000.00		$ 9,000.00
						103 Adult Reading Room						$ -
						Millwork wall panel w/furring	1,567.00	sf	$ 54,845.00	$ 54,845.00		$ 109,690.00
						Acoustic panel premium	500.00	sf	$ 22,500.00	$ 17,500.00		$ 40,000.00
						Programmer, cust. Serv., librarian desk	34.00	lf	$ 27,200.00	$ 13,600.00		$ 40,800.00
						Public computer station	43.00	lf				$ -
						104 Checkout						$ -
						Millwork wall panel w/furring	468.00	sf	$ 2,340.00	$ 4,680.00		$ 7,020.00
						Built-in shelving	6.00	lf	$ 4,800.00	$ 2,400.00		$ 7,200.00
						201 Children's Reading Room, 202 Early Childhood						$ -
						Built-in bench with cubbies	53.00	lf	$ 42,400.00	$ 21,200.00		$ 63,600.00
						Millwork wall panel w/furring	1,328.00	sf	$ 6,640.00	$ 13,280.00		$ 19,920.00
						Public computer station, includes built-in custom tables and bench	42.00	lf	$ 58,800.00	$ 25,200.00		$ 84,000.00
						Librarian desk	24.00	lf	$ 33,600.00	$ 9,600.00		$ 43,200.00
						204 Corridor						$ -
						Millwork wall panel w/furring	298.00	sf	$ 1,490.00	$ 2,980.00		$ 4,470.00
						205 Stroller Storage						$ -
						Millwork wall panel w/furring	254.00	sf	$ 8,890.00	$ 8,890.00		$ 17,780.00
						206 Multi purpose room						$ -
						Custom fintube enclosure	21.00	lf	$ 16,800.00	$ 8,400.00		$ 25,200.00
						208 Staff Pantry						$ -

Department of Design and Construction

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						Wall and base cabinets - solid surface counter top and backsplash was in section 123661.16 (Appliance by owner)	11.00	lf	$ 11,000.00	$ 5,500.00		$ 16,500.00
						Solid surface counter top and back splash (Appliance by owner)	11.00	lf	$ 2,750.00	$ 2,750.00		$ 5,500.00
			06 41 16 Plastic-Laminate-Clad Architectural Cabinets									$ -
						Plastic laminate-clad architectural cabinets (Included in section 06 40 23)						$ -
			06 42 16 Flush Wood Paneling									$ -
						Acoustical panels at ceiling	1,082.00	sf				$ -
						103	503.00		$ 28,168.00	$ 5,030.00		$ 33,198.00
						201	579.00		$ 32,424.00	$ 5,790.00		$ 38,214.00
												$ -
						Acoustic Millwork Ceiling (Accordion Style)	1,119.60	sf				$ -
						Cellar						$ -
						C01	1,119.60	sf	$ 62,664.00	$ 11,190.00		$ 73,854.00
												$ -
						Add for custom wood panels in elevator cab with SS doors	180.00	sf				$ -
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 1,002,119.00**	**$ 764,373.00**		**$ 1,766,492.00**
		DIVISION 07 - THERMAL AND MOISTURE PROTECTION										
			07 11 16 Cementitious Dampproofing									$ -
						Waterproofing						$ -
						Level C						$ -
						Foundation walls with termination bar	2,240.00	sf	$ 50,000.00	$ 33,600.00		$ 83,600.00
						Termination Bars	35.00	ea	$ 2,450.00	$ 1,050.00		$ 3,500.00
			07 14 16 Cold Fluid-Applied Waterproofing									$ -
			07 14 16 Cold Fluid-Applied Waterproofing									$ -
						'Paver - Roof Type 4 (Paver - Roof Type 4,'Paver - Roof Type 4,'Setting bed,'6" Rigid Insulation ,'Drainage board &'Waterproofing)	570.00	sf	$ 10,000.00	$ 7,000.00	$ 2,000.00	$ 19,000.00
			07 16 13 Polymer Modified Cement Waterproofing									$ -
						Polymer modified cement waterproofing						$ -

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						Wall type 3	1,215.00	sf	$ 5,000.00	$ 6,800.00	$ -	$ 11,800.00
			07 16 16 Crystalline Waterproofing									$ -
						Crystalline waterproofing						$ -
						Elevator pit slab and walls	273.00	sf	$ 3,000.00	$ 3,000.00	$ 800.00	$ 6,800.00
						Detention tank	365.50	sf	$ 6,000.00	$ 3,700.00	$ 1,500.00	$ 11,200.00
			07 17 00 Bentonite Waterproofing									$ -
						Waterproofing						$ -
						Foundation walls with termination bar	3,785.00	sf	$ 30,000.00	$ 21,000.00		$ 51,000.00
						Termination Bars	45.00	ea	$ 1,500.00	$ 2,500.00		$ 4,000.00
			07 20 10 WALL FRAMING SUPPORT SYSTEM FOR CONTINUOUS INSULATION (CI)									$ -
						Load bearing metal stud framing, 6" at exterior wall						$ -
						Wall Type 1						$ -
						6" Metal Stud; 16" O.C,	9,014.00	sf	$ 27,042.00	$ 18,028.00		$ 45,070.00
						Wall Type 2						$ -
						6" Metal Stud; 16" O.C, (includes two sides)	2,740.00	sf	$ 8,220.00	$ 5,480.00		$ 13,700.00
			07 21 00 Thermal Insulation									$ -
						Foundation						$ -
						Foundation rigid insulation - 6"	2,400.00	sf	$ 7,200.00	$ 4,800.00		$ 12,000.00
						Drainage mat	2,400.00	sf	$ 7,200.00	$ 4,800.00		$ 12,000.00
												$ -
						Foundation rigid insulation - 2"	3,785.00	sf	$ 7,600.00	$ 3,800.00		$ 11,400.00
						Drainage mat	3,785.00	sf	$ 10,000.00	$ 8,500.00		$ 18,500.00
												$ -
						Under slab rigid insulation - 2"	6,668.00	sf	$ 13,500.00	$ 15,000.00		$ 28,500.00
												$ -
						Secant pile walls (boring/drilling)						$ -

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						6" Rigid insulation	2,240.00	sf	$ 5,600.00	$ 6,000.00		$ 11,600.00
												$ -
						Wall Type 1 (Exterior)						$ -
						4" Semi-rigid insulation	9,014.00	sf	$ 10,000.00	$ 16,000.00		$ 26,000.00
						6" Mineral wool	9,014.00	sf	$ 18,000.00	$ 20,000.00		$ 38,000.00
												$ -
						Wall Type 3						$ -
						4" Semi-rigid insulation	1,215.00	sf	$ 1,215.00	$ 2,430.00		$ 3,645.00
			07 26 00 Vapor Retarders									$ -
						Vapor barriers under concrete slab on grade	6,928.00	sf	$ 13,856.00	$ 6,928.00		$ 20,784.00
			07 27 26 Fluid-Applied Membrane Air Barriers									$ -
						Wall Type 1 (Exterior)						$ -
						Air barrier	9,014.00	sf	$ 45,070.00	$ 18,028.00		$ 63,098.00
						Wall Type 2 (Exterior)						$ -
						Air barrier (includes two sides)	2,740.00	sf	$ 27,400.00	$ 10,960.00		$ 38,360.00
			07 42 13.16 Metal Plate Wall Panels									$ -
						1/2" Aluminum plate Sills and Jambs	800.00	lf	$ 22,000.00	$ 55,000.00		$ 77,000.00
						1/2" Aluminum plate jamb	600.00	sf	$ 22,000.00	$ 18,000.00		$ 40,000.00
						3/4" Aluminum plate soffit	125.00	sf	$ 8,500.00	$ 38,000.00		$ 46,500.00
												$ -
						Aluminum metal rain screen system - wall type IV	600.00	sf	$ 65,000.00	$ 26,000.00		$ 91,000.00
			07 54 23 Thermoplastic-Polyolefin Roofing									$ -
						Membrane Roofing System - Roof Type 3	1,176.00	$/sf				$ -
						Thermoplastic Polyolefin 60 Mil	11.76	sq	$ 13,992.70	$ 26,200.04		$ 40,192.74
						½" Continuous cover board 10% waste	1,293.60	sf	$ 2,146.65	$ 2,478.11		$ 4,624.76
						8" Rigid Insulation	1,176.00	sf	$ 29,653.69	$ 6,195.28		$ 35,848.97

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			07 62 00 Sheet Metal Flashing and Trim									$ -
						Metal Flashing Mechanical Room	68.00	lf	$ 2,055.50	$ 3,751.67		$ 5,807.17
						SS Metal trim (planted roof railing base)	495.00	sf	$ 9,900.00	$ 5,200.00		$ 15,100.00
			07 71 00 Roof Specialties									$ -
						Roof and Wall and Parapet Caps	635.00	sf	$ 5,367.15	$ 16,837.97		$ 22,205.12
						1/2" Aluminum plate Sills and Jambs (in section 05 50 00)	800.00	lf				$ -
						1/2" Aluminum plate jamb (in section 05 50 00)	600.00	sf				$ -
						3/4" Aluminum plate soffit (in section 05 50 00)	125.00	sf				$ -
						Formed aluminum coping	963.00	sf	$ 92,000.00	$ 65,500.00		$ 157,500.00
			07 72 00 Roof Accessories									$ -
						Hatch-type heat and smoke vents	1.00	ea	$ 1,757.99	$ 1,239.06		$ 2,997.05
			07 72 73 Vegetated Roof Systems									$ -
						Green - Roof Type 1 (8" Rigid Insulation,Waterproofing ,Detention layer,Honeycomb,Needle mineral wool,Aluminum catch drain box &Gutters (2 Edges)X2)	4,796.00	SF	$ 76,000.00	$ 24,027.64		$ 100,027.64
						Sedum Mat (Sedum sieboldii,Sedum mat trays,S3 Drainage layer soil,Planting soil; 4",Planting soil; 4",1-5/8" Thick Paver & Setting bed)	4,796.00	SF	$ 34,000.00	$ 18,109.43		$ 52,109.43
			07 81 00 Applied Fire Protection									$ -
						Sprayed fireproofing on metal decking						$ -
						Entrance Slab	570.00	sf	$ 2,433.90	$ 1,043.10		$ 3,477.00
						1st Floor	5,670.00	sf	$ 26,300.00	$ 12,000.00		$ 38,300.00
						2nd Floor	5,060.00	sf	$ 23,500.00	$ 11,950.00		$ 35,450.00
						3rd Floor (Mech)	1,540.00	sf	$ 6,575.80	$ 2,818.20		$ 9,394.00
						Elevator roof	110.00	sf	$ 3,132.00	$ 2,055.12		$ 5,187.12
						Roof	5,690.00	sf	$ 158,000.00	$ 103,000.00		$ 261,000.00
												$ -
						Patch and fill fireproofing where needed	18,588.00	gsf	$ 271,291.86	$ 116,267.94		$ 387,559.80
			07 81 23 Intumescent Fire Protection									$ -
						Intumescent fire-resistive coatings; MEP spaces	1,000.00	sf	$ 12,500.00	$ 5,860.00		$ 18,360.00

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			07 84 13 Penetration Firestopping									$ -
						Penetration firestopping (included in section 07 81 00)						$ -
			07 84 43 Joint Firestopping									$ -
						Joint firestopping (included in section 07 81 00)						$ -
			07 91 00 Preformed Joint Seals									$ -
						Exterior preformed, foam joint seals	18,588.00	gsf	$ 34,125.00	$ 14,625.00		$ 48,750.00
			07 92 00 Joint Sealants									$ -
						Exterior preformed, foam joint seals	18,588.00	gsf	$ 28,000.00	$ 12,000.00		$ 40,000.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 1,260,085.24**	**$ 807,562.56**	**$ 4,300.00**	**$ 2,071,947.80**
		DIVISION 08 - OPENINGS										
			08 11 13 Hollow Metal Doors and Frames									$ -
						Metal doors & metal frames - (double) 6-0"x8' doors w/std hardware (knob & hinge, flush bolt):						$ -
						C19	1.00	ea	$ 3,000.00	$ 1,750.00		$ 4,750.00
						Metal doors & metal frames - (single) 3x8 doors w/std hardware (knob & hinge,):	7.00	ea				$ -
						C09	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						C10	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						C18	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						C20	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						ST4.1	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						216	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						ST2.5	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
												$ -
						Metal doors & metal frames - (single) 3x8 doors w/std hardware (knob & hinge,) - rated	3.00	ea				$ -
						C20	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						C21	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						C22	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						C24	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
												$ -
						Metal doors & metal frames - (single) 2'-10"x8' doors w/std hardware (knob & hinge,):	1.00	ea				$ -
						ST3.2	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
												$ -
						Metal doors & metal frames - (single) 3'-6"x8' doors w/std hardware (knob & hinge,):	2.00	ea				$ -
						ST2.2	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
						ST2.3	1.00		$ 3,000.00	$ 1,750.00		$ 4,750.00
												$ -
						Metal doors & metal frames - (Double) 4x8 doors w/std HD hardware (knob & hinge:) -ss	4.00	pr				$ -
						Metal Door Rm PE1.1 (Elevator)	1.00		$ 4,000.00	$ 3,500.00		$ 7,500.00
						Metal Door Rm PE1.2 (Elevator)	1.00		$ 4,000.00	$ 3,500.00		$ 7,500.00
						Metal Door Rm PE1.3 (Elevator)	1.00		$ 4,000.00	$ 3,500.00		$ 7,500.00
						111	1.00		$ 4,000.00	$ 3,500.00		$ 7,500.00
												$ -
						7-Pin Lockset Cylinder	18.00	ea	$ 7,200.00	$ 6,300.00		$ 13,500.00
			08 12 16 Aluminum Frames									$ -
						Aluminum door frames - interior (in section 08 14 16)						$ -
			08 14 16 Flush Wood Doors									$ -
						Wood doors & Alum frames - (single & double 3x8 doors w/hardware): Type A	10.00	ea				$ -
						107	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						108.1	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						108.2	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						109	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						110	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						112	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						113	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						209	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						210	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						211	1.00		$ 4,000.00	$ 1,750.00		$ 5,750.00
						Wood doors & HM metal frames - (single & double 3x8 doors w/ hardware): Type A	1.00	ea				$ -
						C23	1.00		$ 4,000.00	$ 2,750.00		$ 6,750.00
												$ -
						Wood doors & Rated wood frames - (single & double 3x8 doors w/ hardware): Type A	34.00	ea	$ 102,000.00	$ 59,500.00		$ 161,500.00
						C23						$ -
						ST2.1	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						ST3.1	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						ST2.4	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
												$ -
						Wood doors & Wood frames - (single doors w/ hardware): Type A	16.00	ea				$ -
						C08	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C11	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C12	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C13	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C14	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C15	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C16	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C17	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						105	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						106	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						207	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						212	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						213	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						214	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						215	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						ST4.3	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						Wood doors & Wood frames - (double doors w/ hardware): Type A	4.00	pr				$ -
						C01	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C02	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C03.1	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
						C03.2	1.00		$ 4,400.00	$ 2,750.00		$ 7,150.00
												$ -
						7-Pin Lockset Cylinder	65.00	ea	$ 12,800.00	$ 16,250.00		$ 29,050.00
			08 31 13 Access Doors and Frames									$ -
						Elevator hatch	1.00	ea	$ 850.00	$ 1,500.00		$ 2,350.00
						Added stair venting	1.00	ea	$ 750.00	$ 1,500.00		$ 2,250.00
			08 31 23	FLOOR DOORS								$ -
						Aluminum floor doors at detention tank	1.00	ea	$ 3,500.00	$ 1,500.00		$ 5,000.00
						Access ladder to detention tank	1.00	ea	$ 4,200.00	$ 1,500.00		$ 5,700.00
			08 33 23.13 Overhead Rapid Coiling Doors									$ -
						Rm 111 10-2" x 8'-0" Trash - Rolling Shutters	1.00	ea	$ 6,850.00	$ 3,850.00		$ 10,700.00
			08 42 13 Aluminum-Framed Entrances									$ -
						Alum /glass doors; double Type D - (all glass top & bottom rail double doors w/hardware):						$ -
						102.1	1.00	pr	$ 12,667.50	$ 8,655.90		$ 21,323.40
						102.2	1.00	pr	$ 12,667.50	$ 8,655.90		$ 21,323.40
												$ -
						Single Glass Door Type C ½ Glass w/hardware	2.00	ea	$ 25,335.00	$ 17,311.80		$ 42,646.80
						C06 Quiet Room	1.00	ea	$ 12,667.50	$ 8,655.90		$ 21,323.40

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						206 Multipurpose Room	1.00	ea	$ 12,667.50	$ 8,655.90		$ 21,323.40
						Double Glass Door Type C ½ Glass w/hardware	2.00	pr	$ 25,335.00	$ 17,311.80		$ 42,646.80
						101 Vestibule	2.00		$ 25,335.00	$ 17,311.80		$ 42,646.80
			08 44 23 Structural Sealant Glazed Curtain Walls									$ -
						Type 1 System consists of insulating glass and high-performance solar control coatings on Surface 2 [GL-1] four-side structural silicone glazed into thermally broken, custom profile extruded aluminum frames and trim. Frames are set within masonry cavity wall	2,136.00	sf				$ -
						East Elevation	1,210.00	sf	$ 192,279.48	$ 123,366.69	$ 38,323.97	$ 353,970.14
						North Elevation	926.00	sf	$ 149,496.52	$ 96,758.31	$ 31,676.03	$ 277,930.86
						West Elevation		sf				$ -
						South Elevation		sf				$ -
			08 71 00 Door Hardware									$ -
						Door Hardware (Included in sections 081113 & 081416)						$ -
			08 71 13 Automatic Door Operators									$ -
						Power door operators - for swinging doors	16.00	ea	$ 76,800.00	$ 34,100.00		$ 110,900.00
			08 80 00 Glazing									$ -
						Interior Floor to Ceiling Large Glazed Walls						$ -
						Glass walls floor to ceiling ; 3/4" thick low-iron tempered and laminated Type 1	1,909.00	sf				$ -
						C04 Lobby	65.00		$ 11,296.07	$ 9,905.22		$ 21,201.29
						C05 Teen Reading Room	458.00		$ 79,593.87	$ 69,793.53		$ 149,387.41
						C06 Quiet Room	294.00		$ 51,093.01	$ 44,801.96		$ 95,894.97
						101 Vestibule	110.00		$ 19,116.43	$ 16,762.64		$ 35,879.07
						104 Checkout	15.00		$ 2,606.79	$ 2,285.81		$ 4,892.60
						107 Manager Office	102.00		$ 17,726.15	$ 15,543.54		$ 33,269.68
						108 Staff Office	96.00		$ 16,683.43	$ 14,629.21		$ 31,312.64
						201 Children's Reading Room, 202 Early Childhood	419.00		$ 72,816.23	$ 63,850.42		$ 136,666.65
						206 Multipurpose Room	319.00		$ 55,437.65	$ 48,611.65		$ 104,049.31
						207 Staff Lounge	31.00		$ 5,387.36	$ 4,724.02		$ 10,111.37

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
												$ -
						Wood mullion premium	973.00	sf				$ -
						C05 Teen Reading Room	458.00		$ 32,060.00	$ 13,740.00		$ 45,800.00
						201 Children's Reading Room, 202 Early Childhood	419.00		$ 29,330.00	$ 12,570.00		$ 41,900.00
												$ -
						Glass Smoke Baffle	48.00	sf				$ -
						102 Lobby	24.00		$ 20,000.00	$ 5,500.00		$ 25,500.00
						C04 Lobby	24.00		$ 20,000.00	$ 5,500.00		$ 25,500.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 1,322,748.00**	**$ 884,652.01**	**$ 70,000.00**	**$ 2,277,400.00**
		DIVISION 09 - FINISHES										
			09 21 16.23 Gypsum Board Shaft Wall Assemblies									$ -
						Cellar level						$ -
						Type 1.3 1hr Shaft Wall Assembly Type X (4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 1 layer 5/8" GWB on the other side, level 5 finish and 3" Sound Attenuation Insulation)	910.00	SF	$ 20,200.00	$ 35,950.00		$ 56,150.00
						Type 2.1 2hr Wall Assembly Type X (4" Metal Stud; 24" O.C 2 layer ⅝" w/ high impact each side GWB BS level 5 finish ,3 ½" sound attenuation)	1,474.00	sf	$ 29,495.00	$ 46,850.00		$ 76,345.00
						Type 2.2 2hr Shaft Wall Assembly Type X('4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 2 layers 5/8" GWB on the other side, level 5 finish ,'3" Sound Attenuation Insulation)	486.00	sf/$	$ 9,720.00	$ 15,350.00		$ 25,070.00
						1st Floor level						$ -
						Type 1.3 1hr Shaft Wall Assembly Type X ('4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 1 layer 5/8" GWB on the other side, level 5 finish ,'3" Sound Attenuation Insulation)	178.00	sf	$ 3,560.00	$ 8,000.00		$ 11,560.00
						Type 2.1 2hr Wall Assembly Type X ('4" Metal Stud; 24" O.C 2 layer ⅝" w/ high impact each side GWB BS level 5 finish ,'3 ½" sound attenuation)	642.00	sf	$ 12,840.00	$ 18,000.00		$ 30,840.00
						Type 2.2 2hr Shaft Wall Assembly Type X ('4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 2 layers 5/8" GWB on the other side, level 5 finish ,'3" Sound Attenuation Insulation)	764.00	sf	$ 15,280.00	$ 35,650.00		$ 50,930.00
						Type 2.3 2hr Shaft Wall Assembly Type X ('4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 2 layers 5/8" GWB + 1 layer 5/8"GWB on the other side, level 5 finish,'3" Sound Attenuation Insulation &'w/ recessed base)	323.00	sf	$ 6,460.00	$ 10,600.00		$ 17,060.00
						2nd Floor level						$ -
						Type 1.3 1hr Shaft Wall Assembly Type X('4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 1 layer 5/8" GWB on the other side, level 5 finish &'3" Sound Attenuation Insulation)	677.00	sf	$ 13,540.00	$ 25,540.00		$ 39,080.00
						Type 2.2 2hr Shaft Wall Assembly Type X('4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 2 layers 5/8" GWB on the other side, level 5 finish & '3" Sound Attenuation Insulation)	791.00	sf	$ 15,820.00	$ 26,950.00		$ 42,770.00

Department of Design and Construction

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Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						'Type 2.2 2hr Shaft Wall Assembly Type X (6" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 2 layers 5/8" GWB + 1 layer 5/8"GWB on the other side, level 5 finish & '3" Sound Attenuation Insulation)	145.00	sf	$ 2,900.00	$ 6,850.00		$ 9,750.00
						Type 2.4 2hr Shaft Wall Assembly Type X('5" Metal Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 2 layers 5/8" GWB on the other side, level 5 finish &'3" Sound Attenuation Insulation)	350.00	sf	$ 7,000.00	$ 13,460.00		$ 20,460.00
						Mechanical roof level						$ -
						Type 2.2 2hr Shaft Wall Assembly Type X('4" Metal C-H Stud; 24 O.C 1 layer 1"GWB Liner panel one side and 2 layers 5/8" GWB on the other side, level 5 finish &'3" Sound Attenuation Insulation)	120.00	sf	$ 2,400.00	$ 5,925.00		$ 8,325.00
			09 22 16 Non-Structural Metal Framing									$ -
						Non-structural metal framing (partition, ceilings and soffits) (Included in section 09 29 00)						$ -
			09 29 00 Gypsum Board									$ -
						Cellar level						$ -
						Type 0.1 Typical STC55 ('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer/1side GWB BS level 5 finish &'3 ½" sound attenuation	2,214.00	sf	$ 44,250.00	$ 85,690.00		$ 129,940.00
												$ -
						Type 1.1 Typical STC53 Type X 1-hour('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer GWB BS level 5 finish &'3 ½" sound attenuation)	426.00	sf	$ 9,000.00	$ 15,850.00		$ 24,850.00
												$ -
						Type 1.1 Typical STC53 Type X 1-hour('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer GWB one side level 5 finish &'3 ½" sound attenuation)	6,210.00	sf	$ 125,000.00	$ 195,855.00		$ 320,855.00
												$ -
						Type 3.1 3 hr Typical STC 3 layers('4" Metal Stud; 24" O.C ½" w/ high impact 3/3 layers/1/2" Type C GWB BS level 5 finish &'3" thermafiber SAFB,'w/ recessed base)	960.00	sf	$ 18,000.00	$ 36,410.00		$ 54,410.00
												$ -
						1st Floor level						$ -
						Type 0.1 Typical STC55 ('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer/1side GWB BS level 5 finish &'3 ½" sound attenuation)	1,280.00	sf	$ 22,000.00	$ 45,230.00		$ 67,230.00
												$ -
						Type 0.1 Typical STC55 ('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer GWB BS level 5 finish	1,581.00	sf	$ 30,000.00	$ 51,250.00		$ 81,250.00
												$ -
						Type 0.2 Typical STC55 Type X('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer GWB one side level 5 finish & '3 ½" sound attenuation)	3,205.00	sf	$ 62,000.00	$ 106,485.00		$ 168,485.00
												$ -
						2nd Floor level						$ -
						4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer/1side GWB BS level 5 finish	1,827.00	sf	$ 35,640.00	$ 60,000.00		$ 95,640.00

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												$ -
						Type 1.1 Typical STC53 Type X 1-hour ('Type 0.1 Typical STC55 ('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer GWB BS level 5 finish &'3 ½" sound attenuation & '3 ½" sound attenuation)	400.00	sf	$ 8,000.00	$ 15,000.00		$ 23,000.00
												$ -
						Type 0.2 Typical STC55 Type X ('4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer GWB one side level 5 finish &'3 ½" sound attenuation)	3,369.00	sf	$ 65,150.00	$ 120,000.00		$ 185,150.00
												$ -
						Mechanical roof level						$ -
						Type 1.1 Typical STC53 Type X 1-hour (4" Metal Stud; 16" O.C ⅝" w/ high impact 1 layer GWB BS level 5 finish & '3 ½" sound attenuation)	405.00	sf	$ 8,000.00	$ 15,000.00		$ 23,000.00
						Painted Ceiling GWB - Lvl5 Finish w/Integral Slot Diffusers	2,448.00	sf				
						C04	72.00	sf	$ 882.00	$ 1,911.60		$ 2,793.60
						C05	117.00	sf	$ 1,433.25	$ 3,106.35		$ 4,539.60
						C06	50.00	sf	$ 612.50	$ 1,327.50		$ 1,940.00
						C07	119.00	sf	$ 1,457.75	$ 3,159.45		$ 4,617.20
						C11	22.00	sf	$ 269.50	$ 584.10		$ 853.60
						C12	22.00	sf	$ 269.50	$ 584.10		$ 853.60
						C13	22.00	sf	$ 269.50	$ 584.10		$ 853.60
						C14	33.00	sf	$ 404.25	$ 876.15		$ 1,280.40
						C15	17.00	sf	$ 208.25	$ 451.35		$ 659.60
						C16	18.00	sf	$ 220.50	$ 477.90		$ 698.40
						ST2	146.00	sf	$ 1,788.50	$ 3,876.30		$ 5,664.80
						1st Floor						
						101	59.00	sf	$ 722.75	$ 1,566.45		$ 2,289.20
						102	73.00	sf	$ 894.25	$ 1,938.15		$ 2,832.40
						103	195.00	sf	$ 2,388.75	$ 5,177.25		$ 7,566.00
						104	241.00	sf	$ 2,952.25	$ 6,398.55		$ 9,350.80
						105	14.00	sf	$ 171.50	$ 371.70		$ 543.20

Department of Design and Construction

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						106	24.00	sf	$ 294.00	$ 637.20		$ 931.20
						107	70.00	sf	$ 857.50	$ 1,858.50		$ 2,716.00
						108	107.00	sf	$ 1,310.75	$ 2,840.85		$ 4,151.60
						112	21.00	sf	$ 257.25	$ 557.55		$ 814.80
						113	87.00	sf	$ 1,065.75	$ 2,309.85		$ 3,375.60
						2nd floor						
						201	145.00	sf	$ 1,776.25	$ 3,849.75		$ 5,626.00
						202	58.00	sf	$ 710.50	$ 1,539.90		$ 2,250.40
						203/ST1	117.00	sf	$ 1,433.25	$ 3,106.35		$ 4,539.60
						204	139.00	sf	$ 1,702.75	$ 3,690.45		$ 5,393.20
						205	46.00	sf	$ 563.50	$ 1,221.30		$ 1,784.80
						206	70.00	sf	$ 857.50	$ 1,858.50		$ 2,716.00
						207	107.00	sf	$ 1,310.75	$ 2,840.85		$ 4,151.60
						208	72.00	sf	$ 882.00	$ 1,911.60		$ 2,793.60
						209	39.00	sf	$ 477.75	$ 1,035.45		$ 1,513.20
						211	44.00	sf	$ 539.00	$ 1,168.20		$ 1,707.20
						212	22.00	sf	$ 269.50	$ 584.10		$ 853.60
						213	22.00	sf	$ 269.50	$ 584.10		$ 853.60
						214	19.00	sf	$ 232.75	$ 504.45		$ 737.20
						215	19.00	sf	$ 232.75	$ 504.45		$ 737.20
												$ -
						Suspended GWB Ceilings Including Black iron Hanging System - Lvl 4 Finish	526.00	sf				$ -
						Cellar						$ -
						C02	13.00	sf	$ 148.33	$ 346.06		$ 494.39
						C03	64.00	sf	$ 730.24	$ 1,703.68		$ 2,433.92
						C08	18.00	sf	$ 205.38	$ 479.16		$ 684.54

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						C10	30.00	sf	$ 342.30	$ 798.60		$ 1,140.90
						C17	52.00	sf	$ 593.32	$ 1,384.24		$ 1,977.56
						C18	12.00	sf	$ 136.92	$ 319.44		$ 456.36
						1st Floor						
						109	11.00	sf	$ 125.51	$ 292.82		$ 418.33
						110	11.00	sf	$ 125.51	$ 292.82		$ 418.33
						111	35.00	sf	$ 399.35	$ 931.70		$ 1,331.05
						112						$ -
						113						$ -
						2nd floor						$ -
						204						$ -
						205						$ -
						207						$ -
						208						$ -
						209						$ -
						210	23.00	sf	$ 262.43	$ 612.26		$ 874.69
						216	92.00	sf	$ 1,049.72	$ 2,449.04		$ 3,498.76
						Circulation						
						ST3	110.00	sf	$ 1,255.10	$ 2,928.20		$ 4,183.30
						ST4	55.00	sf	$ 627.55	$ 1,464.10		$ 2,091.65
			09 30 13 Ceramic Tiling									$ -
						Ceramic Wall Tile (Includes Cement Board)	2,361.00	sf				
						C11 WC	140.00		$ 1,350	$ 2,366	$ -	$ 3,715.60
						C12 WC	190.00		$ 1,832	$ 3,211	$ -	$ 5,042.60
						C13 WC	190.00		$ 1,832	$ 3,211	$ -	$ 5,042.60
						C14 WC	190.00		$ 1,832	$ 3,211	$ -	$ 5,042.60

Department of Design and Construction

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						C15 WC	130.00		$ 1,253	$ 2,197	$ -	$ 3,450.20
						C16 WC	130.00		$ 1,253	$ 2,197	$ -	$ 3,450.20
						C18 Custodian Closet	90.00		$ 868	$ 1,521	$ -	$ 2,388.60
						105 WC	190.00		$ 1,832	$ 3,211	$ -	$ 5,042.60
						110 Custodian Closet	154.00		$ 1,485	$ 2,603	$ -	$ 4,087.16
						209 WC	220.00		$ 2,121	$ 3,718	$ -	$ 5,838.80
						210 Custodian Closet	77.00		$ 742	$ 1,301	$ -	$ 2,043.58
						212 WC	190.00		$ 1,832	$ 3,211	$ -	$ 5,042.60
						213 WC	140.00		$ 1,350	$ 2,366	$ -	$ 3,715.60
						214 WC	140.00		$ 1,350	$ 2,366	$ -	$ 3,715.60
						215 WC	190.00		$ 1,832	$ 3,211	$ -	$ 5,042.60
												$ -
						Ceramic Floor Tile	102.00	sf			$ -	$ -
						C18 Custodian Closet	22.00		$ 223	$ 755	$ -	$ 978.34
						110 Custodian Closet	25.00		$ 254	$ 858	$ -	$ 1,111.75
						210 Custodian Closet	55.00		$ 558	$ 1,888	$ -	$ 2,445.85
												$ -
						Tile Base	279.00	lf				$ -
						C11 WC	14.00		$ 134	$ 223		$ 357.00
						C12 WC	19.00		$ 182	$ 303		$ 484.50
						C13 WC	19.00		$ 182	$ 303		$ 484.50
						C14 WC	19.00		$ 182	$ 303		$ 484.50
						C15 WC	13.00		$ 124	$ 207		$ 331.50
						C16 WC	13.00		$ 124	$ 207		$ 331.50
						C18 Custodian Closet	9.00		$ 86	$ 143		$ 229.50
						105 WC	19.00		$ 182	$ 303		$ 484.50

Department of Design and Construction

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						110 Custodian Closet	44.00		$ 421	$ 701		$ 1,122.00
						209 WC	22.00		$ 210	$ 351		$ 561.00
						210 Custodian Closet	22.00		$ 210	$ 351		$ 561.00
						212 WC	19.00		$ 182	$ 303		$ 484.50
						213 WC	14.00		$ 134	$ 223		$ 357.00
						214 WC	14.00		$ 134	$ 223		$ 357.00
						215 WC	19.00		$ 182	$ 303		$ 484.50
			09 51 13 Acoustical Panel Ceilings									$ -
						Acoustic Ceiling Panel System on black iron support	7,591.00	sf				$ -
						Cellar						$ -
						C04	436.00	sf	$ 10,913.08	$ 20,103.96		$ 31,017.04
						C05	1,299.00	sf	$ 32,513.97	$ 59,896.89		$ 92,410.86
						C06	151.00	sf	$ 3,779.53	$ 6,962.61		$ 10,742.14
						C07	177.00	sf	$ 4,430.31	$ 8,161.47		$ 12,591.78
						1st Floor						$ -
						101	249.00	sf	$ 6,232.47	$ 11,481.39		$ 17,713.86
						102	277.00	sf	$ 6,933.31	$ 12,772.47		$ 19,705.78
						103	1,857.00	sf	$ 46,480.71	$ 85,626.27		$ 132,106.98
						107	124.00	sf	$ 3,103.72	$ 5,717.64		$ 8,821.36
						108	198.00	sf	$ 4,955.94	$ 9,129.78		$ 14,085.72
						2nd floor			$ -	$ -		$ -
						201	1,570.00	sf	$ 39,297.10	$ 72,392.70		$ 111,689.80
						202	244.00	sf	$ 6,107.32	$ 11,250.84		$ 17,358.16
						203/ST1	378.00	sf	$ 9,461.34	$ 17,429.58		$ 26,890.92
						204	190.00	sf	$ 4,755.70	$ 8,760.90		$ 13,516.60
						205	90.00	sf	$ 2,252.70	$ 4,149.90		$ 6,402.60

Department of Design and Construction

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Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						206	351.00	sf	$ 8,785.53	$ 16,184.61		$ 24,970.14
												$ -
						Acoustic Ceiling Tile	1,604.00	sf				$ -
						Cellar						$ -
						C08	32.00	sf	$ 638.40	$ 997.44		$ 1,635.84
						C10	114.00	sf	$ 2,274.30	$ 3,553.38		$ 5,827.68
						C11	24.00	sf	$ 478.80	$ 748.08		$ 1,226.88
						C12	24.00	sf	$ 478.80	$ 748.08		$ 1,226.88
						C13	24.00	sf	$ 478.80	$ 748.08		$ 1,226.88
						C14	13.00	sf	$ 259.35	$ 405.21		$ 664.56
						C15	14.00	sf	$ 279.30	$ 436.38		$ 715.68
						C16	13.00	sf	$ 259.35	$ 405.21		$ 664.56
						C17	72.00	sf	$ 1,436.40	$ 2,244.24		$ 3,680.64
						C18	24.00	sf	$ 478.80	$ 748.08		$ 1,226.88
						1st Floor			$ -	$ -		$ -
						105	32.00	sf	$ 638.40	$ 997.44		$ 1,635.84
						106	24.00	sf	$ 478.80	$ 748.08		$ 1,226.88
						107	125.00	sf	$ 2,493.75	$ 3,896.25		$ 6,390.00
						108	134.00	sf	$ 2,673.30	$ 4,176.78		$ 6,850.08
						109	14.00	sf	$ 279.30	$ 436.38		$ 715.68
						110	14.00	sf	$ 279.30	$ 436.38		$ 715.68
						111	33.00	sf	$ 658.35	$ 1,028.61		$ 1,686.96
						112	137.00	sf	$ 2,733.15	$ 4,270.29		$ 7,003.44
						113	132.00	sf	$ 2,633.40	$ 4,114.44		$ 6,747.84
						ST4	118.00	sf	$ 2,354.10	$ 3,678.06		$ 6,032.16
						2nd floor			$ -	$ -		$ -

Department of Design and Construction

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Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						207	168.00	sf	$ 3,351.60	$ 5,236.56		$ 8,588.16
						209	34.00	sf	$ 678.30	$ 1,059.78		$ 1,738.08
						210	32.00	sf	$ 638.40	$ 997.44		$ 1,635.84
						211	33.00	sf	$ 658.35	$ 1,028.61		$ 1,686.96
						212	24.00	sf	$ 478.80	$ 748.08		$ 1,226.88
						213	24.00	sf	$ 478.80	$ 748.08		$ 1,226.88
						214	14.00	sf	$ 279.30	$ 436.38		$ 715.68
						215	14.00	sf	$ 279.30	$ 436.38		$ 715.68
						216	144.00	sf	$ 2,872.80	$ 4,488.48		$ 7,361.28
			09 65 13 Resilient Base and Accessories						$ -	$ -		$ -
						Vinyl Base	796.00	lf	$ 15,880.20	$ 24,811.32		$ 40,691.52
						C08	20.00		$ 399.00	$ 623.40		$ 1,022.40
						C09	74.00		$ 1,476.30	$ 2,306.58		$ 3,782.88
						C10	58.00		$ 1,157.10	$ 1,807.86		$ 2,964.96
						C17	50.00		$ 997.50	$ 1,558.50		$ 2,556.00
						C19	17.00		$ 339.15	$ 529.89		$ 869.04
						C20	103.00		$ 2,054.85	$ 3,210.51		$ 5,265.36
						C21	11.00		$ 219.45	$ 342.87		$ 562.32
						C22	36.00		$ 718.20	$ 1,122.12		$ 1,840.32
						C23	104.00		$ 2,074.80	$ 3,241.68		$ 5,316.48
						C25	17.00		$ 339.15	$ 529.89		$ 869.04
						109	10.00		$ 199.50	$ 311.70		$ 511.20
						111	28.00		$ 558.60	$ 872.76		$ 1,431.36
						216	95.00		$ 1,895.25	$ 2,961.15		$ 4,856.40
						ST2	59.00		$ 1,177.05	$ 1,839.03		$ 3,016.08
						ST3	44.00		$ 877.80	$ 1,371.48		$ 2,249.28

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						ST4	70.00		$ 1,396.50	$ 2,181.90		$ 3,578.40
			09 66 23 Resinous Matrix Terrazzo Flooring									$ -
						Terrazzo Flooring (thin-set epoxy resin)	7,338.00	sf				$ -
						C01	933.00		$ 32,841.60	$ 21,524.31	$ 2,267.19	$ 56,633.10
						C02	13.00		$ 457.60	$ 299.91	$ 31.59	$ 789.10
						C03	64.00		$ 2,252.80	$ 1,476.48	$ 155.52	$ 3,884.80
						C04	508.00		$ 17,881.60	$ 11,719.56	$ 1,234.44	$ 30,835.60
						C05	998.00		$ 35,129.60	$ 23,023.86	$ 2,425.14	$ 60,578.60
						C06	201.00		$ 7,075.20	$ 4,637.07	$ 488.43	$ 12,200.70
						C07	296.00		$ 10,419.20	$ 6,828.72	$ 719.28	$ 17,967.20
						C11	34.00		$ 1,196.80	$ 784.38	$ 82.62	$ 2,063.80
						C12	46.00		$ 1,619.20	$ 1,061.22	$ 111.78	$ 2,792.20
						C13	46.00		$ 1,619.20	$ 1,061.22	$ 111.78	$ 2,792.20
						C14	46.00		$ 1,619.20	$ 1,061.22	$ 111.78	$ 2,792.20
						C15	31.00		$ 1,091.20	$ 715.17	$ 75.33	$ 1,881.70
						C16	31.00		$ 1,091.20	$ 715.17	$ 75.33	$ 1,881.70
						101	103.00		$ 3,625.60	$ 2,376.21	$ 250.29	$ 6,252.10
						102	350.00		$ 12,320.00	$ 8,074.50	$ 850.50	$ 21,245.00
						103	1,581.00		$ 55,651.20	$ 36,473.67	$ 3,841.83	$ 95,966.70
						104	241.00		$ 8,483.20	$ 5,559.87	$ 585.63	$ 14,628.70
						105	46.00		$ 1,619.20	$ 1,061.22	$ 111.78	$ 2,792.20
						106	48.00		$ 1,689.60	$ 1,107.36	$ 116.64	$ 2,913.60
						203	246.00		$ 8,659.20	$ 5,675.22	$ 597.78	$ 14,932.20
						204	329.00		$ 11,580.80	$ 7,590.03	$ 799.47	$ 19,970.30
						205	72.00		$ 2,534.40	$ 1,661.04	$ 174.96	$ 4,370.40
						206	421.00		$ 14,819.20	$ 9,712.47	$ 1,023.03	$ 25,554.70

Department of Design and Construction

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						207	274.00		$ 9,644.80	$ 6,321.18	$ 665.82	$ 16,631.80
						208	71.00		$ 2,499.20	$ 1,637.97	$ 172.53	$ 4,309.70
						211	77.00		$ 2,710.40	$ 1,776.39	$ 187.11	$ 4,673.90
						212	46.00		$ 1,619.20	$ 1,061.22	$ 111.78	$ 2,792.20
						213	33.00		$ 1,161.60	$ 761.31	$ 80.19	$ 2,003.10
						214	33.00		$ 1,161.60	$ 761.31	$ 80.19	$ 2,003.10
						215	46.00		$ 1,619.20	$ 1,061.22	$ 111.78	$ 2,792.20
						PE1	74.00		$ 2,604.80	$ 1,707.18	$ 179.82	$ 4,491.80
						ST1	-					$ -
						Included in section 05 50 00						$ -
						Precast epoxy terrazzo base (not used)						$ -
			09 68 13 Tile Carpeting									$ -
						Carpet Flooring	3,716.00	sf				$ -
						C05 Teen Reading Room	413.00		$ 3,014.42	$ 2,009.61		$ 5,024.03
						103 Adult Reading Room	496.00		$ 3,620.03	$ 2,413.48		$ 6,033.51
						107 Manager Office	194.00		$ 3,014.42	$ 2,009.61		$ 5,024.03
						108 Staff Office	305.00		$ 3,620.03	$ 2,413.48		$ 6,033.51
						201 Children's Reading Room	1,715.00		$ 3,014.42	$ 2,009.61		$ 5,024.03
						202 Early Childhood	302.00		$ 3,620.03	$ 2,413.48		$ 6,033.51
						209	55.00		$ 3,014.42	$ 2,009.61		$ 5,024.03
						216 Storage	236.00		$ 3,620.03	$ 2,413.48		$ 6,033.51
			09 91 13 Exterior Painting									$ -
						Exterior painting - door ST2.5	1.00	ea	$ 25.00	$ 175.00		$ 200.00
			09 91 23 Interior Painting									$ -
						Miscellaneous painting interior	18,588.00	gsf	$ 477.00	$ 4,247.00		$ 4,724.00
						Ceilings	10,565.00	sf	$ 1,754.00	$ 15,785.00		$ 17,539.00

Department of Design and Construction

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						Ceilings - Structure (Fill and Paint)	900.00	sf	$ 475.00	$ 4,250.00		$ 4,725.00
						Wall painting	34,862.00	sf	$ 2,426.00	$ 34,862.00		$ 37,288.00
						Doors, Frame and Trim	49.00	ea	$ 490.00	$ 4,900.00		$ 5,390.00
												$ -
						Concrete Sealant (Assume 2 Coats)	2,271.00	sf				$ -
						C08 Corridor	48.00		$ 116.94	$ 50.12		$ 167.06
						C09 Boiler Room	184.00		$ 448.28	$ 192.12		$ 640.39
						C10 Storage	144.00		$ 350.82	$ 150.35		$ 501.18
						C17 Corridor	124.00		$ 302.10	$ 129.47		$ 431.57
						C19 IT Closet	42.00		$ 102.32	$ 43.85		$ 146.18
						C20 Electrical Room	256.00		$ 623.69	$ 267.30		$ 890.98
						C21 Inverter	26.00		$ 63.34	$ 27.15		$ 90.49
						C22 Gas Room	89.00		$ 216.83	$ 92.93		$ 309.76
						C23 Water/Mech Room	258.00		$ 628.56	$ 269.38		$ 897.94
						C24 Elevator Controls	41.00		$ 99.89	$ 42.81		$ 142.70
						109 Maintenance Closet	25.00		$ 60.91	$ 26.10		$ 87.01
						111 Trash Room	68.00		$ 165.67	$ 71.00		$ 236.67
						112 Corridor	158.00		$ 384.93	$ 164.97		$ 549.90
						113 Book Return	219.00		$ 533.55	$ 228.66		$ 762.21
						201/202 -Children's reading room/Early Childhood	160.00		$ 389.81	$ 167.06		$ 556.86
						ST2 Stair 2	146.00		$ 420.00	$ 3,780.00		$ 4,200.00
						ST3 Stair 3	110.00		$ 560.00	$ 5,040.00		$ 5,600.00
						ST4 Stair 4	173.00		$ 420.00	$ 3,780.00		$ 4,200.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 1,178,840.20**	**$ 1,838,102.93**	**$ 17,831.34**	**$ 3,034,774.47**
		DIVISION 10 - SPECIALTIES										
			10 11 00 Visual Display Units									$ -

Department of Design and Construction

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						C01 Multipurpose Room						$ -
						Wall-mounted glass marker board	989.00	sf	$ 28,492.70	$ 14,816.30		$ 43,309.00
			10 14 00 Signage									$ -
						Exterior signage - pin mounted letters	1.00	loc	$ 29,209.34	$ 11,014.04		$ 40,223.38
						Interior Signage						$ -
						Vinyl letters mounted to interior side - type 1B	2.00	loc	$ 158.73	$ 68.03		$ 226.76
						Vinyl letters mounted to interior side - type 1C	2.00	loc	$ 158.73	$ 68.03		$ 226.76
						Room Identification (wall mounted at doors) - 2A	31.00	loc	$ 1,559.80	$ 668.48		$ 2,228.28
						Room Identification (wall mounted at doors) - 2B	1.00	loc	$ 50.32	$ 21.56		$ 71.88
						Room Identification (wall mounted at doors) - 2C	9.00	loc	$ 2,072.57	$ 888.25		$ 2,960.82
						Room Identification (wall mounted at doors) - 2D	1.00	loc	$ 436.23	$ 186.95		$ 623.18
						Room Identification (wall mounted at doors) - 2E	1.00	loc	$ 655.81	$ 281.06		$ 936.87
						Room Identification (wall mounted at doors) - 2F	3.00	loc	$ 1,707.15	$ 843.18		$ 2,550.34
						Room Identification (wall mounted at doors) - 2G	1.00	loc	$ 901.57	$ 386.39		$ 1,287.95
						Book stack end/wall stack ID (titles printed on removable inserts)	51.00	loc	$ 4,962.12	$ 2,126.62		$ 7,088.75
						Pictogram (wall mounted at doors)	12.00	loc	$ 2,763.43	$ 1,184.33		$ 3,947.76
						Fire safety (wall mounted)	29.00	loc	$ 6,678.29	$ 2,862.13		$ 9,540.42
						Other interior signage	3.00	loc	$ 158.73	$ 68.03		$ 226.76
			10 28 13 Toilet Accessories									$ -
						Bathrooms						$ -
						Toilet tissue dispenser	12.00	ea	$ 828.00	$ 600.00		$ 1,428.00
						Paper towel dispenser (surface mounted)	13.00	ea	$ 3,083.00	$ 775.00		$ 3,858.00
						Waste receptacle	12.00	ea	$ 1,428.00	$ 4,500.00		$ 5,928.00
						Circular waste receptacle	1.00	ea	$ 1,434.97	$ 25.00		$ 1,459.97
						Soap dispenser (surface mounted)	12.00	ea	$ 3,005.00	$ 600.00		$ 3,605.00
						Grab bars; 1-1/4" diam,18" long (vertical)	7.00	ea	$ 238.00	$ 1,500.00		$ 1,738.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Grab bars; 1-1/4" diam,36" long (horizontal)	7.00	ea	$ 266.00	$ 1,500.00		$ 1,766.00
						Grab bars; 1-1/4" diam,42" long (horizontal)	7.00	ea	$ 282.03	$ 1,500.00		$ 1,782.03
						Sanitary Napkin Disposal (recessed)	12.00	ea	$ 2,232.00	$ 3,000.00		$ 5,232.00
						Toilet Seat cover dispenser	12.00	ea	$ 480.00	$ 1,500.00		$ 1,980.00
						Mirror; 18" x 36"	12.00	ea	$ 2,052.00	$ 3,000.00		$ 5,052.00
						Electric Hand Dryer	12.00	ea	$ 5,496.00	$ 6,000.00		$ 11,496.00
						Changing tables	5.00	ea	$ 7,275.00	$ 7,500.00		$ 14,775.00
			10 44 13 Fire Protection Cabinets									$ -
						Fire protection cabinet for portable fire extinguisher - cold-rolled steel sheet with tempered glass/ss door						$ -
						Basement	4.00	ea	$ 800.00	$ 1,400.00		$ 2,200.00
						First floor	5.00	ea	$ 1,000.00	$ 1,750.00		$ 2,750.00
						Second floor	5.00	ea	$ 1,000.00	$ 1,750.00		$ 2,750.00
			10 44 16 Fire Extinguishers									$ -
						Fire extinguishers						$ -
						Basement	4.00	ea	$ 400.00	$ 200.00		$ 600.00
						First floor	5.00	ea	$ 500.00	$ 250.00		$ 750.00
						Second floor	5.00	ea	$ 500.00	$ 250.00		$ 750.00
			10 51 13 Metal Lockers									$ -
						Metal lockers - 6' high	12.00	ea	$ 12,900.00	$ 6,000.00		$ 18,900.00
			10 75 23 Wall-Mounted Flagpoles									$ -
						North Elevation (Flagpole Assembly)						$ -
						Aluminum flagpole with light at pole top - wall mounted	35.50	lf	$ 25,000.00	$ 5,000.00		$ 30,000.00
						Flag	1.00	ea	$ 225.00	$ 25.00		$ 250.00
						Light at Pole top (In section 26 50 00)						$ -
						Connection to Lightning protection system	1.00	ea	$ 500.00	$ 1,500.00		$ 2,000.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 150,890.52**	**$ 85,608.38**		**$ 236,498.90**

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

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Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

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		DIVISION 11 - EQUIPMENT										
			11 30 13 Residential Appliances									$ -
						Pantry Appliances (Furnish By Owner)						$ -
			11 51 16 Book Depositories									$ -
						101 Vestibule						$ -
						Book return (self check out machine)	3.00	ea	$ 17,499.99	$ 7,499.97		$ 24,999.96
						Interior Book Return (LM1200 - RFID and barcode hybrid, with touchscreen interface and patron receipt printing)	1.00	ea	$ 5,833.33	$ 2,499.99		$ 8,333.32
						Exterior Book Return (LM2100 - RFID and barcode hybrid, with touchscreen interface and patron receipt printing)	1.00	ea	$ 5,833.33	$ 2,499.99		$ 8,333.32
						Book Conveyors	1.00	ea	$ 5,833.33	$ 2,499.99		$ 8,333.32
			11 51 19 Book Theft Protection Equipment									$ -
						Stainless Steel Bollards	4.00	ea	$ 56,000.00	$ 24,000.00		$ 80,000.00
						Security gates	4.00	ea	$ 31,500.00	$ 13,500.00		$ 45,000.00
			11 51 23 Library Stack Systems									$ -
						C04 Lobby						$ -
						Adult media shelving 15x8	15.00	lf	$ 3,832.50	$ 1,646.34		$ 5,478.84
						C05 Teen Reading Room						$ -
						Built-in Montel Aetnastak shelving system 21x8	42.00	lf	$ 15,365.85	$ 4,609.75		$ 19,975.60
						Rm 103 Adult Reading Room						$ -
						Built-in Montel Aetnastak shelving system 21x8	21.00	lf	$ 5,378.00	$ 2,304.87		$ 7,682.87
						Built-in Montel Aetnastak shelving system 30x8	30.00	lf	$ 7,682.92	$ 3,292.68		$ 10,975.60
						72' Shelves 8 high	36.00	lf	$ 9,219.51	$ 3,951.21		$ 13,170.72
						108' Shelves 4 high	54.00	lf	$ 13,829.26	$ 5,926.82		$ 19,756.08
						3' High Shelving	64.00	lf	$ 16,390.24	$ 7,024.38		$ 23,414.62
						Rm 104 Checkout						$ -
						7' High Shelving "reserves"	12.00	lf	$ 3,073.17	$ 1,317.07		$ 4,390.24
						201 Children's Reading Room						$ -
						Montel Aetnastak shelving system 3' high	72.00	lf	$ 26,341.46	$ 7,902.43		$ 34,243.89

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Built-in Montel Aetnastak shelving system 6' high	42.00	lf	$ 10,756.09	$ 4,609.75		$ 15,365.84
						202 Early Childhood						$ -
						8' High Shelving	22.00	lf	$ 5,634.14	$ 2,414.63		$ 8,048.77
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 240,003.12**	**$ 97,499.87**		**$ 337,502.99**
		DIVISION 12 - FURNISHINGS										
			12 24 13 Roller Window Shades									$ -
						Motorized shades	775.00	sf	$ 16,134.00	$ 3,800.00		$ 19,934.00
			12 48 16 Entrance Floor Grilles									$ -
						Walk off mat in vestibule	182.00	sf	$ 26,465.00	$ 5,500.00		$ 31,965.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 42,599.00**	**$ 9,300.00**		**$ 51,899.00**
		DIVISION 13 - SPECIAL CONSTRUCTION										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 14 - CONVEYING EQUIPMENT										
			14 21 00 Electric Traction Elevators									$ -
						Passenger Elevators, Traction, Machine roomless , 3 Floor, 3 Stops	3.00	STOP	$ 137,200.00	$ 58,800.00		$ 196,000.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 137,200.00**	**$ 58,800.00**		**$ 196,000.00**
		DIVISION 21 - FIRE SUPPRESSION										
			21 05 13 Common Motor Requirements for Fire-Suppression Equipment									$ -
						Included in 21 32 13						$ -
			21 05 17 Sleeves and Sleeve Seals for Fire-Suppression Piping									$ -
						Firestopping Sleeves	8.00	ea	$ 400.00	$ 1,850.00		$ 2,250.00
			21 05 18 Escutcheons for Fire Suppression Piping									$ -
						Included in 21 13 13						$ -
			21 05 23 General-Duty Valves for Water-Based Fire-Suppression Piping									$ -
						3" Fcva	4.00	ea	$ 6,062.00	$ 2,598.00		$ 8,660.00
						6" Automatic Ball Drip	2.00	ea	$ 3,031.00	$ 1,299.00		$ 4,330.00

Department of Design and Construction

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Hard Cost Estimate (Level 2)

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						6" Flanged Valve	1.00	ea	$ 6,500.00	$ 3,000.00		$ 9,500.00
						2-1/2" X 6" Three Way Roof Manifold	1.00	ea	$ 5,500.00	$ 3,000.00		$ 8,500.00
			21 05 29 Hangers and Supports for Fire-Suppression Piping and Equipment									$ -
						Included in 21 13 13						$ -
			21 05 53 Identification for Fire-Suppression Piping and Equipment									$ -
						Included in 21 13 13						$ -
			21 08 00 Commissioning of Fire Suppression									$ -
						Testing (5 days 1 JM and 1 FM)	80.00	hrs		$ 88,945.00		$ 88,945.00
			21 11 19 Fire-Department Connections									$ -
						6" Siamese Fdc	2.00	ea	$ 17,000.00	$ 12,000.00		$ 29,000.00
			21 13 13 Wet-Pipe Sprinkler Systems									$ -
						Sprinkler Heads- 3/4" NPT, 17/32" Orifice	189.00	ea	$ 46,305.00	$ 19,845.00		$ 66,150.00
						1" Blk Sch 40 - Thrd	1,162.00	lf	$ 32,536.00	$ 13,944.00		$ 46,480.00
						1-1/2" Blk Sch 40 - Thrd 10'/5SP	500.00	lf	$ 15,750.00	$ 6,750.00		$ 22,500.00
						3" Blk Sch 40 - Grvd 10'/60 SP	515.00	lf	$ 19,827.50	$ 8,497.50		$ 28,325.00
						6" Blk Sch 10 Weld	325.00	lf	$ 9,555.00	$ 4,095.00		$ 13,650.00
						2" Drain Riser (Galv Sch 40)	120.00	lf	$ 3,192.00	$ 1,368.00		$ 4,560.00
			21 32 13 Electric-Drive, Vertical-Turbine Fire Pumps									$ -
						25HP Fire Sprinkler Booster Pump (Includes Equipment Pads)	1.00	ea	$ 18,200.00	$ 7,800.00		$ 26,000.00
						3/4HP Fire Sprinkler Jockey Pump	1.00	ea	$ 1,400.00	$ 600.00		$ 2,000.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 185,258.50**	**$ 175,591.50**		**$ 360,850.00**
		DIVISION 22 - PLUMBING										
			22 05 17 Sleeves and Sleeve Seals for Plumbing Piping									$ -
						Firestopping Sleeves	15.00	ea	$ 1,312.50	$ 562.50		$ 1,875.00
			22 05 19 Meters and Gauges for Plumbing Piping									$ -
						New Water Meter	1.00	ea	$ 2,244.20	$ 961.80		$ 3,206.00

Department of Design and Construction

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Hard Cost Estimate (Level 2)

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			22 05 23.12 Ball Valves for Plumbing Piping									$ -
												$ -
						Included in 22 11 16, 22 13 16 and 22 14 12						$ -
			22 05 23.13 Butterfly Valves for Plumbin									$ -
						Included in 22 11 16, 22 13 16 and 22 14 12						$ -
			22 05 23.14 Check Valves for Plumbing Piping									$ -
						Included in 22 11 16, 22 13 16 and 22 14 12						$ -
			22 05 23.15 Gate Valves for Plumbing Piping									$ -
						Included in 22 11 16, 22 13 16 and 22 14 13						$ -
			22 05 29 Hangers and Supports for Plumbing Piping and Equipment									$ -
						Included in 22 11 16, 22 13 16 and 22 14 13						$ -
			22 05 33 Heat Tracing for Plumbing Piping									$ -
						Storm Pipe Heat Trace	550.00	lf	$ 19,819.80	$ 8,494.20		$ 28,314.00
			22 05 53 Identification for Plumbing Piping and Equipment									$ -
						Included in 22 11 16, 22 13 16, 22 13 19, 22 13 29, 22 14 13, 22 14 63 and 22 33 00						$ -
			22 05 93 Testing, Adjusting and Balancing for Plumbing									$ -
						Testing and Flushig	1.00	ls	$ 5,437.60	$ 2,330.40		$ 7,768.00
			22 07 19 Plumbing Piping Insulation									$ -
						Domestic Water Insulation CHW/HW	1,910.00	lf	$ 17,500.70	$ 7,500.30		$ 25,001.00
						Storm Pipe Heat Trace	550.00	lf	$ 2,750.00	$ 3,000.00		$ 5,750.00
			22 08 00 Commissioning of Plumbing									$ -
						Included with equipment and in 22 05 93						$ -
			22 11 16 Domestic Water Piping									$ -
						Facility water service w/ 3" RPZ, water meter, Gate Valves, Strainers, Etc. (per typical water service detail)	1.00	ea	$ 7,216.30	$ 3,092.70		$ 10,309.00
						6" Fire Sprinkler service w/ RPZ, water meter, Gate Valves, Strainers, Etc. (per typical water service detail)	1.00	ea	$ 12,597.90	$ 5,399.10		$ 17,997.00
												$ -

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						CHW Piping						$ -
						2.5" Type L Cu.	375.00	lf	$ 9,346.40	$ 4,005.60		$ 13,352.00
						2" Type L Cu.	50.00	lf	$ 240.80	$ 103.20		$ 344.00
						1.5" Type L Cu.	395.00	lf	$ 5,392.80	$ 2,311.20		$ 7,704.00
						1" Type L Cu.	55.00	lf	$ 1,346.80	$ 577.20		$ 1,924.00
						3/4" Type L Cu.	600.00	lf	$ 7,761.60	$ 3,326.40		$ 11,088.00
												$ -
						HW Piping						$ -
						3/4" Type L Cu.	435.00	lf	$ 4,567.50	$ 10,657.50		$ 15,225.00
												$ -
						Tools and rentals - Not Required	1.00	ls				$ -
			22 11 19 Domestic Water Piping Specialties									$ -
						Hose Bib, NFWH and NFGH	6.00	ea	$ 3,418.10	$ 1,464.90		$ 4,883.00
												$ -
			22 13 16 Sanitary Waste and Vent Piping									$ -
						Provide new waste POE	1.00	ls	$ 1,200.00	$ 3,000.00		$ 4,200.00
						Trenching	126.00	lf	$ 1,000.00	$ 3,000.00		$ 4,000.00
						3" Cast Iron Srv.Wt.--Below Grade	18.00	lf	$ 756.00	$ 3,000.00		$ 3,756.00
						4" Cast Iron Srv.Wt.--Below Grade	108.00	lf	$ 2,277.10	$ 975.90		$ 3,253.00
						2" Cast Iron Hubless--Above grade	1,060.80	lf	$ 10,124.80	$ 4,339.20		$ 14,464.00
						3" Cast Iron Srv.Wt.--Above Grade	179.40	lf	$ 1,320.90	$ 566.10		$ 1,887.00
						4" Cast Iron Hubless--Above Grade	331.50	lf	$ 5,873.70	$ 2,517.30		$ 8,391.00
			22 13 19 Sanitary Waste Piping Specialties									$ -
						6" House Trap	2.00	ea	$ 1,449.00	$ 621.00		$ 2,070.00
						Garbage receptors	3.00	ea	$ 150.00	$ 500.00		$ 650.00
			22 13 19.13 Sanitary Drains									$ -

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						6" Floor Drain	2.00	ea	$ 1,694.00	$ 726.00		$ 2,420.00
						4" Floor Drain	3.00	ea	$ 3,557.40	$ 1,524.60		$ 5,082.00
						Trap primer	5.00	ea	$ 2,092.30	$ 896.70		$ 2,989.00
						Linear Slot Trench Drain (Including Trenching)	95.00	lf	$ 40,000.00	$ 15,000.00	$ 6,000.00	$ 61,000.00
			22 13 29 Sanitary Sewerage Pumps									$ -
						5 HP Sewage Ejector Pumps SEP-C1,2	2.00	ea	$ 75,839.40	$ 32,502.60		$ 108,342.00
						Ejector Pit Pump Cover	1.00	ea	$ 250.00	$ 1,500.00		$ 1,750.00
						Elevator Sump Pump ESP-C-1	1.00	ls	$ 12,282.20	$ 5,263.80		$ 17,546.00
			22 14 13 Facility Storm Drainage Piping									$ -
						Utility Storm POE	1.00	ls				$ -
						4" Cast Iron Hubless--Above grade	220.00	lf	$ 11,324.60	$ 4,853.40		$ 16,178.00
						6" Cast Iron Hubless--Above Grade	265.00	lf	$ 7,123.90	$ 3,053.10		$ 10,177.00
						8" Cast Iron Hubless--Above Grade	65.00	lf	$ 552.30	$ 236.70		$ 789.00
			22 14 23 Storm Drainage Piping Specialties									$ -
						Included in 22 14 23						$ -
			22 14 63 Facility Storm-Water Retention Tanks									$ -
						Provide new storm water detention tank: Includes digging.	1.00	ls	$ 6,500.00	$ 6,000.00		$ 12,500.00
						Tank Access Hatch	1.00	ea	$ 750.00	$ 3,000.00		$ 3,750.00
						STP-1,2 DEP Storm Transfer Pumps	2.00	ea	$ 61,839.40	$ 20,502.60		$ 82,342.00
						DEP Pump Control Panel	1.00	ea	$ 3,000.00	$ 3,000.00		$ 6,000.00
						8" OF Spills	1.00	ea		$ 2,000.00		$ 2,000.00
						5" OF Spills	1.00	ea		$ 2,000.00		$ 2,000.00
						6" House Trap	2.00	ea	$ 1,449.00	$ 621.00		$ 2,070.00
			22 33 00 Electric Domestic Water Heaters									
						EHWH-1 Electric Ceiling Mnt. Water Heater Tank	3.00	ea	$ 8,893.50	$ 3,811.50		$ 12,705.00
						EHWH-1 Drip-Pans w/ leak detection	3.00	ea	$ 1,524.60	$ 653.40		$ 2,178.00

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			22 42 13.13 Commercial Water Closets									$ -
						Water Closet	11.00	ea				$ -
						Mop sink	3.00	ea				$ -
			22 42 16.13 Commercial Lavatories									$ -
						Lavatory	11.00	ea	$ 7,260.00	$ 33,000.00		$ 40,260.00
						Lay-In Sinks	2.00	ea	$ 900.00	$ 3,000.00		$ 3,900.00
			22 47 13 Drinking Fountains									$ -
						Drinking Fountains	2.00	ea	$ 3,600.00	$ 6,000.00		$ 9,600.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 203,088.90**	**$ 130,998.10**		**$ 334,087.00**
		DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)										
			23 05 13 Common Motor Requirements for HVAC Equipment									$ -
						Permits/sign off	1.00	ea		$ 20,000.00		$ 20,000.00
						Shop drawings	1.00	ea		$ 78,200.00		$ 78,200.00
						Rigging and delivery	1.00	ea		$ 40,000.00		$ 40,000.00
						Tools and rentals	1.00	ls		$ 10,600.00		$ 10,600.00
			23 05 16 Expansion Fittings and Loops for HVAC Piping									$ -
						Expansion Pipe Loops	4.00	ea	$ 4,000.00	$ 9,600.00		$ 13,600.00
			23 05 17 Sleeves and Sleeve Seals for HVAC Piping									$ -
						Fire stopping	20.00	ea	$ 10,000.00	$ 20,000.00		$ 30,000.00
			23 05 19 Meters and Gauges for HVAC Piping									$ -
						Included in piping and BMS						$ -
			23 05 23.12 Ball Valves for HVAC Piping									$ -
						Included in 23 21 13						$ -
			23 05 23.13 Butterfly Valves for HVAC Piping									$ -
						Pump Butterfly Valves	4.00	ea	$ 4,000.00	$ 4,000.00		$ 8,000.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
			23 05 23.14 Check Valves for HVAC Piping									$ -
						Pump Check Valves	2.00	ea	$ 1,200.00	$ 4,800.00		$ 6,000.00
			23 05 29 Hangers and Supports for HVAC Piping and Equipment									$ -
						Included in 23 21 13						$ -
			23 05 46 Coatings for HVAC									$ -
						Included in equipment						$ -
			23 05 48.13 Vibration Controls for HVAC									$ -
						Boiler Inertia Pads	2.00	lot	$ 800.00	$ 2,700.00		$ 3,500.00
			23 05 53 Identification for HVAC Piping and Equipment									$ -
						Pipe ID	1,741.00	lf	$ 5,300.00	$ 10,400.00		$ 15,700.00
			23 05 93 Testing, Adjusting, and Balancing for HVAC									$ -
						Testing Adjusting and Balancing	1.00	lot		$ 5,000.00		$ 5,000.00
			23 07 13 Duct Insulation									$ -
						Interior Duct Insulation	13,551.52	sf	$ 33,878.79	$ 33,878.79		$ 67,757.58
			23 07 16 HVAC Equipment Insulation									$ -
						Included with equipment						$ -
			23 07 19 HVAC Piping Insulation									$ -
						Pipe insulation	1,741.00	lf	$ 51,356.02	$ 22,006.24		$ 73,362.26
			23 08 00 Commissioning of HVAC									$ -
						Included with equipment and DDC Contract						$ -
			23 09 23 Direct-Digital Control System for HVAC									$ -
						Start-Up and Owner Training	1.00	ea		$ 10,000.00		$ 10,000.00
						Front-End Operator Equipment (Operator Workstations	2.00	ea	$ 12,600.00	$ 5,400.00		$ 18,000.00
						Outdoor AHU BMS Points	22.00	ea	$ 36,608.00	$ 24,376.00		$ 60,984.00
						TX,GX,TF Fans	6.00	ea	$ 9,984.00	$ 6,648.00		$ 16,632.00
						VRF Communication Cable	450.00	lf	$ 4,500.00	$ 9,000.00		$ 13,500.00

Department of Design and Construction

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Project ID: LQQ122-RG

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Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						FCU-1-1	6.00	ea	$ 9,984.00	$ 6,648.00		$ 16,632.00
						Air Terminal Units	104.00	ea	$ 173,056.00	$ 115,232.00		$ 288,288.00
						Finned Tube	15.00	ea	$ 24,960.00	$ 16,620.00		$ 41,580.00
						Condensing Boilers	16.00	ea	$ 26,624.00	$ 17,728.00		$ 44,352.00
						HW Pumps	6.00	ea	$ 9,984.00	$ 6,648.00		$ 16,632.00
						Reconciliation Add 1/6/23	1.00	lot	$ 1,664.00	$ 1,108.00		$ 2,772.00
			23 09 23.11 Control Valves									$ -
						Included in 23 09 23						$ -
			23 09 23.12 Control Dampers									$ -
						Included in 23 09 23						$ -
			23 09 23.13 Energy Meters									$ -
						Included in 23 09 23						$ -
			23 09 23.14 Flow Instruments									$ -
						Included in 23 09 23						$ -
			23 09 23.16 Gas Instruments									$ -
						Included in 23 09 23						$ -
			23 09 23.18 Leak Detection Instruments									$ -
						Included in 23 09 23						$ -
			23 09 23.19 Moisture Instruments									$ -
						Included in 23 09 23						$ -
			23 09 23.22 Position Instruments									$ -
						Included in 23 09 23						$ -
			23 09 23.23 Pressure Instruments									$ -
						Included in 23 09 23						$ -
			23 09 23.27 Temperature Instruments									$ -
						Included in 23 09 23						$ -

Department of Design and Construction

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Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
			23 09 93.11 Sequence of Operation for HVAC DDC									$ -
						Included in 23 09 23						$ -
			23 11 23 Facility Natural-Gas Piping									$ -
						Provide new gas service w/ meter	1.00	ls	$6,000.00	$3,800.00		$ 9,800.00
						Provide new Gas Piping to AHU, Boiler and Furnace	1.00	ea	$12,500.00	$9,000.00		$ 21,500.00
						Pipe insulation	1.00	lot	$1,000.00	$3,500.00		$ 4,500.00
			23 21 13 Hydronic Piping									$ -
						3" CS HWS/R Piping	155.00	lf	$ 15,500.00	$ 23,250.00		$ 38,750.00
						2" Cu. HWS/R Propress	206.00	lf	$ 18,540.00	$ 26,780.00		$ 45,320.00
						1.5" Cu. HWS/R Propress	260.00	lf	$ 22,100.00	$ 33,800.00		$ 55,900.00
						1.25" Cu. HWS/R Propress	281.00	lf	$ 22,480.00	$ 36,530.00		$ 59,010.00
						1" Cu. HWS/R Propress	209.00	lf	$ 16,720.00	$ 27,170.00		$ 43,890.00
						3/4" Cu. HWS/R Propress	630.00	lf	$ 25,200.00	$ 51,030.00		$ 76,230.00
			23 21 16 Hydronic Piping Specialties									$ -
						Included in 23 21 13						$ -
			23 21 23 Hydronic Pumps									$ -
						Boiler Pump (40 gpm @ 70 TDH) with pipe connections, suction diffuser, TDV, strainers, etc.	1.00	ea	$ 9,870.00	$ 9,600.00		$ 19,470.00
						Boiler Pump (40 gpm @ 70 TDH) with pipe connections, suction diffuser, TDV, strainers, etc.	1.00	ea	$ 9,870.00	$ 9,600.00		$ 19,470.00
						Expansion Tank make up pump	1.00	ea	$ 5,320.00	$ 4,400.00		$ 9,720.00
			23 23 00 Refrigerant Piping									$ -
						CU.ACR Tubing	1,500.00	lf	$ 30,000.00	$ 45,000.00		$ 75,000.00
			23 25 13 Water Treatment for Closed-Loop Hydronic Systems									$ -
						30 Gal. Chemical Water Treatment Tank	1.00	lot	$ 3,473.00	$ 2,000.00		$ 5,473.00
						Chemical Injector Circulator	1.00	lot	$ 3,493.00	$ 2,000.00		$ 5,493.00
			23 31 13 Metal Ducts									$ -
						Min. 24g Galvanized Ductwork - Supply air, General Exhaust Air and Return Air including hangers and reinforcing	22,360.00	lbs	$ 223,600.00	$ 447,200.00		$ 670,800.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
			23 31 19.13 Shop Fabricated HVAC Casings									$ -
						Fire-Wrap as Indicated	430.00	sf	$ 6,450.00	$ 8,600.00		$ 15,050.00
			23 33 00 Air Duct Accessories			**Labor In 23 31 13**						$ -
						Volume damper (GRD damper included in GRD figure)	20.00	ea	$ 2,000.00			$ 2,000.00
						Fire/Smoke damper	14.00	ea	$ 16,000.00			$ 16,000.00
						Equipment Sound Attenuators down stream of all variable/constant volume boxes	28.00	ea	$ 36,400.00			$ 36,400.00
						Equipment Sound Attenuators (1) AHU	1.00	ea	$ 1,800.00			$ 1,800.00
			23 33 46 Flexible Ducts									$ -
						Included in 23 37 13.13						$ -
			23 34 13 Axial HVAC Fans			**Labor In 23 31 13**						$ -
						Inverter Closet Exhaust Fan 350 cfm	1.00	ea	$ 2,750.00			$ 2,750.00
						General Exhaust Fan 1,150 cfm	1.00	ea	$ 14,000.00			$ 14,000.00
						Toilet Exhaust Fan 1,200 cfm	1.00	ea	$ 1,200.00			$ 1,200.00
			23 36 00 Air Terminal Units			**Labor In 23 31 13**						$ -
						VAV Boxes <1500cfm with hat water reheat coil	20.00	ea	$ 20,000.00			$ 20,000.00
						Fan-Powered terminal unit with hot water reheat coil	8.00	ea	$ 2,400.00			$ 2,400.00
			23 37 13.13 Air Diffusers			**Labor In 23 31 13**						$ -
						Linear diffusers (Includes Plenum Sections and Blank-Offs)	1,025.00	lf	$ 10,250.00			$ 10,250.00
						LD Plenums (Typically Provided as LD Accessory)	200.00	lf	$ 2,400.00			$ 2,400.00
			23 37 13 Diffusers, Registers, and Grilles			**Labor In 23 31 13**						$ -
						Rnd Register and Wall Grilles	21.00	ea	$ 19,950.00			$ 19,950.00
			23 41 00 Particulate Air Filtration									$ -
						Included in 23 73 43.19						$ -
			23 51 23 Gas Vents									$ -
						Provide new round gas exhaust duct	800.00	lbs	$ 11,200.00	$ 16,800.00		$ 28,000.00
			23 51 33 Insulated Sectional Chimneys									$ -

Department of Design and Construction

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Project ID: LQQ122-RG

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Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Boiler Flue and Outdoor Air: Steel, Double-Wall Vent Pipe 8" Rnd	140.00	lf	$ 1,400.00	$ 2,800.00		$ 4,200.00
			23 52 16 Condensing Boilers			**Labor In 23 21 13**						$ -
						350 MBH Condensing Boilers w/ Pipe Connections, Expansion Tank and Air Separator	2.00	ea	$ 58,456.00			$ 58,456.00
			23 74 16.13 Packaged, Large-Capacity, Rooftop Air-Conditioning Units			**Labor In 23 31 13**						$ -
						733 MBH Outside Air-Handling Unit w/ DX/Coil gas-fired heater, with MERV 8 & 13 filters	1.00	ea	$ 440,000.00			$ 440,000.00
			23 81 29 Variable Refrigerant Flow HVAC Systems			**Labor In 23 23 00**						$ -
						Split System condenser 1.5 Ton	1.00	ea	$ 1,400.00			$ 1,400.00
						Split System Condenser 3 Ton	1.00	ea	$ 2,200.00			$ 2,200.00
						Split System Condenser 2 Ton	1.00	ea	$ 1,800.00			$ 1,800.00
												$ -
						Interior AC unit 1.5 Ton	1.00	ea	$ 900.00			$ 900.00
						Interior AC unit 3 Ton	1.00	ea	$ 1,200.00			$ 1,200.00
						Interior AC unit 2 Ton	1.00	ea	$ 1,000.00			$ 1,000.00
			23 82 16.11 Hydronic Air Coils			**Labor In 23 21 13**						$ -
						Included in 23 36 00						$ -
			23 82 19 Fan Coil Units									$ -
						1000 CFM HW Fancoil Unit	1.00	ea	$ 1,800.00			$ 1,800.00
												$ -
			23 82 36 Finned-Tube Radiation Heaters			**Labor In 23 21 13**						$ -
				FTR - A		Perimeter Radiant Heating and branch piping	92.00	lf	$ 8,372.00			$ 8,372.00
				FTR - B		Perimeter Radiant Heating and branch piping	20.50	lf	$ 1,865.50			$ 1,865.50
				FTR - C		Perimeter Radiant Heating and branch piping	22.00	lf	$ 2,002.00			$ 2,002.00
			23 82 39.13 Cabinet Unit Heaters			**Labor In 23 21 13**						$ -
				UH - R - 1		HW Unit Heaters and branch piping (37.4 MBH)	1.00	ea	$ 1,200.00			$ 1,200.00
			23 82 39.19 Wall and Ceiling Unit Heaters			**Labor In 23 21 13**						$ -
				UH - 1 - 1		HW Unit Heaters and branch piping (37.4 MBH)	1.00	ea	$ 1,200.00			$ 1,200.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
				UH - 1 - 2		HW Unit Heaters and branch piping (37.4 MBH)	1.00	ea	$ 1,200.00			$ 1,200.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 1,518,960.31**	**$ 1,243,453.03**		**$ 2,762,413.33**
		DIVISION 25 - INTEGRATED AUTOMATION										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 26 - ELECTRICAL										
			26 00 10 Supplemental Requirements for Electrical									$ -
						Rigging and delivery	1.00	ea	$ 5,000.00	$ 12,000.00		$ 17,000.00
						Tools and rentals - Not Required	1.00	ls				$ -
			26 00 11 Facility Performance Requirements for Electrical								$ 35,000.00	$ 35,000.00
						Electrical System Commissioning and Start-Up	14.00	days	$ 5,000.00	$ 36,960.00		$ 41,960.00
			26 05 19 Low-Voltage Electrical Power Conductors and Cables									$ -
						Service Feeders Included in 33 70 00						$ -
						Panelboard Conductor						$ -
						#8G Cable	3.00	clf	$ 282.00	$ 481.00		$ 763.00
						#4G Cable	18.00	clf	$ 2,450.00	$ 3,529.00		$ 5,979.00
												$ -
						Receptacle Conductor						$ -
						#12G Cable	210.00	clf	$ 10,268.00	$ 26,196.00		$ 36,464.00
												$ -
						Lighting Conductor						$ -
						#12G Cable	340.00	clf	$ 16,663.00	$ 42,412.00		$ 59,075.00
												$ -
						Lighting Controls Conductor						$ -
						#12G Cable	280.00	clf	$ 13,713.00	$ 34,927.00		$ 48,640.00
												$ -
						Emergency System Cable						$ -

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						#8G Cable	3.00	clf	$ 306.00	$ 462.00		$ 768.00
						#4G Cable	27.00	clf	$ 5,316.00	$ 6,254.00		$ 11,570.00
												$ -
						Generator Feed						$ -
						500MCM Cable	4.00	clf	$ 6,475.00	$ 3,137.00		$ 9,612.00
												$ -
						Cammilock Disconnect Feeder						$ -
						600MCM Cable	4.00	clf	$ 7,922.00	$ 3,422.00		$ 11,344.00
						#1/0G Cable	1.00	clf	$ 389.00	$ 493.00		$ 882.00
												$ -
						Equipment Disconnect Feeder						$ -
						#12G Cable	46.00	clf	$ 2,090.00	$ 5,738.00		$ 7,828.00
						#10G Cable	23.00	clf	$ 1,444.00	$ 3,280.00		$ 4,724.00
						#8G Cable	10.00	clf	$ 909.00	$ 1,604.00		$ 2,513.00
						#1G Cable	2.00	clf	$ 617.00	$ 678.00		$ 1,295.00
			26 05 26 Grounding and Bonding for Electrical Systems									$ -
						Grounding Wire	6,000.00	lf	$ 28,445.00	$ 25,660.00		$ 54,105.00
			26 05 29 Hangers and Supports for Electrical Systems									$ -
						Included in 26 05 29						$ -
			26 05 33.13 Conduit for Electrical Systems									$ -
						Generator Feeder						$ -
						4" EMT	200.00	lf	$ 6,750.00	$ 14,381.00		$ 21,131.00
												$ -
						Cammilock Disconnect Feeder						$ -
						4" EMT	100.00	lf	$ 3,375.00	$ 7,156.00		$ 10,531.00
												$ -

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						Emergency System Conduit						$ -
						1.5" EMT	500.00	lf	$ 7,740.00	$ 14,970.00		$ 22,710.00
												$ -
						Panelboard Feeder Conduit						$ -
						3/4" EMT Conduit	50.00	lf	$ 400.00	$ 794.00		$ 1,194.00
						1.5" EMT	350.00	lf	$ 5,407.00	$ 10,478.00		$ 15,885.00
						2" EMT Conduit	580.00	lf	$ 9,825.00	$ 17,467.00		$ 27,292.00
												$ -
						Receptacle Conduit						$ -
						3/4" EMT Conduit	7,450.00	lf	$ 61,332.00	$ 118,156.00		$ 179,488.00
												$ -
						Lighting Conduit						$ -
						3/4" EMT Conduit	7,200.00	lf	$ 59,253.00	$ 114,191.00		$ 173,444.00
												$ -
						Lighting Controls Conduit						$ -
						3/4" EMT Conduit	4,000.00	lf	$ 32,700.00	$ 63,440.00		$ 96,140.00
												$ -
						HVAC/Plumbing Equipment Conduit						$ -
						3/4" EMT Conduit	4,000.00	lf	$ 32,700.00	$ 63,440.00		$ 96,140.00
						2.5" EMT Conduit	175.00	lf	$ 3,788.00	$ 6,989.00		$ 10,777.00
												$ -
						Telecom Empty Conduit						$ -
						1" EMT Conduit	1,600.00	lf	$ 14,840.00	$ 27,087.00		$ 41,927.00
						1.25" EMT	550.00	lf	$ 7,786.00	$ 14,780.00		$ 22,566.00
						4" EMT	950.00	lf	$ 32,608.00	$ 68,308.00		$ 100,916.00
												$ -

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						Security Empty Conduit						$ -
						3/4" EMT Conduit	1,200.00	lf	$ 9,693.00	$ 19,032.00		$ 28,725.00
						1.5" EMT	150.00	lf	$ 2,311.00	$ 4,491.00		$ 6,802.00
						2" EMT Conduit	85.00	lf	$ 1,432.00	$ 2,560.00		$ 3,992.00
												$ -
						Fire Alarm Empty Conduit						$ -
						3/4" EMT Conduit	2,300.00	lf	$ 18,688.00	$ 36,479.00		$ 55,167.00
						1.5" EMT	900.00	lf	$ 13,994.00	$ 26,944.00		$ 40,938.00
						2" EMT Conduit	480.00	lf	$ 8,120.00	$ 14,455.00		$ 22,575.00
												$ -
						AV Empty Conduit						$ -
						3/4" EMT Conduit	1,000.00	lf	$ 8,067.00	$ 15,860.00		$ 23,927.00
						1.5" EMT	450.00	lf	$ 6,961.00	$ 13,473.00		$ 20,434.00
						2" EMT Conduit	200.00	lf	$ 3,372.00	$ 6,024.00		$ 9,396.00
			26 05 33.16 Boxes for Electrical Systems									$ -
						Included in 26 09 23						$ -
			26 05 44 Sleeves and Sleeve Seals for Electrical Raceways and Cabling									$ -
						Fire stopping	25.00	ea	$ 625.00	$ 6,000.00		$ 6,625.00
			26 05 48.16 Seismic Controls for Electrical Systems									$ -
						Included in section 26 05 33.13						$ -
			26 05 53 Identification for Electrical Systems									$ -
						Electrical ID at Panel and as Required	55.00	ea	$ 5,500.00	$ 7,500.00		$ 13,000.00
			26 05 73.13 Short-Circuit Studies									$ -
						Included in 26 00 11						$ -
			26 05 73.16 Coordination Studies									$ -
						Included in 26 00 11						$ -

Department of Design and Construction

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			26 05 73.19 Arc-Flash Hazard Analysis									$ -
						Included in 26 00 11						$ -
			26 08 00 Commissioning of Electrical Systems									$ -
						Included in 26 00 11						$ -
			26 09 13 Electrical Power Monitoring									$ -
						Included in 26 24 13						$ -
			26 09 23 Lighting Control Devices									$ -
						Occupancy/Vacancy Sensor	47.00	ea	$ 743.00	$ 2,764.00		$ 3,507.00
						Wall Switch	29.00	ea	$ 459.00	$ 1,705.00		$ 2,164.00
						Wall Switch w/ Keypad	10.00	ea	$ 100.00	$ 1,650.00		$ 1,750.00
						Wall Dimmer	15.00	ea	$ 150.00	$ 1,980.00		$ 2,130.00
						Photo Sensor	12.00	ea	$ 1,200.00	$ 2,277.00		$ 3,477.00
						Lighting Control Driver	40.00	ea	$ 4,000.00	$ 7,590.00		$ 11,590.00
						Management Hub	1.00	ea	$ 1,490.00	$ 3,250.00		$ 4,740.00
												$ -
			26 24 13 Switchboards									$ -
						Switchgear; including CT Cabinet and Metering					$ 130,000.00	$ 130,000.00
						Con Edison Utility Coordination and Fees	1.00	LS	$ 5,000.00			$ 5,000.00
						(1) 1200A Switchboards; 120v/208V - Disconnects carried below	1.00	LS	$ 1,000.00	$ 10,000.00		$ 11,000.00
						Metering for above			$ 500.00	$ 1,891.00		$ 2,391.00
						Surge Protection Devices					$ 5,000.00	$ 5,000.00
			26 24 16 Panelboards									$ -
						Main Distribution Panel: 800A 120v/208v	1.00	ea	$ 1,035.00	$ 5,346.00	$ 110,000.00	$ 116,381.00
						PP-C 400A Panel	1.00	ea	$ 888.00	$ 4,456.00		$ 5,344.00
						LP-C 225A Panel	1.00	ea	$ 666.00	$ 3,564.00		$ 4,230.00
						LP-2 225A Panel	1.00	ea	$ 666.00	$ 3,564.00		$ 4,230.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						UP-C 225A Panel	1.00	ea	$ 666.00	$ 3,564.00		$ 4,230.00
						UP-C-1 225A Panel	1.00	ea	$ 666.00	$ 3,564.00		$ 4,230.00
						UP-IT 100A Panel	1.00	ea	$ 518.00	$ 2,674.00		$ 3,192.00
						UP-2 225A Panel	1.00	ea	$ 666.00	$ 3,564.00		$ 4,230.00
						UP-2-1 100A Panel	1.00	ea	$ 518.00	$ 2,674.00		$ 3,192.00
						Emergency Distribution Panel 800A	1.00	ea	$ 1,035.00	$ 5,346.00		$ 6,381.00
			26 27 13 Electricity Metering									$ -
						Included in 26 24 13						$ -
			26 27 26 Wiring Devices									$ -
						Juction Boxes	49.00	ea	$ 3,131.00	$ 5,675.00		$ 8,806.00
						Provide power to new elevator	1.00	ea	$ 2,794.00	$ 3,480.00		$ 6,274.00
						Provide power to Boilers B-R-1,2	2.00	ea	$ 7,000.00	$ 8,200.00		$ 15,200.00
						Provide power to Sprinkler Booster Pump	1.00	ea	$ 1,702.00	$ 5,200.00		$ 6,902.00
						Provide power to AHU-R-1 Unit	1.00	ea	$ 12,000.00	$ 22,000.00		$ 34,000.00
						Provide power to HW Circ Pumps	2.00	ea	$ 4,400.00	$ 11,000.00		$ 15,400.00
						Provide power to Indoor Split DX evaporators	3.00	ea	$ 3,300.00	$ 15,500.00		$ 18,800.00
						Provide power to Elec. CUH and/or Elec. UH units	4.00	ea	$ 4,400.00	$ 11,000.00		$ 15,400.00
						Provide Power to Split DX Condensing Unit unit	3.00	ea	$ 3,300.00	$ 7,500.00		$ 10,800.00
						Provide power to GX-R-1	1.00	ea	$ 2,200.00	$ 9,520.00		$ 11,720.00
						Provide power to RF-R-1	1.00	ea	$ 2,200.00	$ 8,076.00		$ 10,276.00
						Provide power to TX-R-1	1.00	ea	$ 2,200.00	$ 8,076.00		$ 10,276.00
						Provide power to CAV/VAV	20.00	ea	$ 17,000.00	$ 56,000.00		$ 73,000.00
						Provide power to Fan-Powered Terminal Units	8.00	ea	$ 11,000.00	$ 18,000.00		$ 29,000.00
						Provide power to FCU-1-1	1.00	ea	$ 4,500.00	$ 9,500.00		$ 14,000.00
												$ -
						Enclosed switches and circuit breakers						$ -

Department of Design and Construction

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						400A- Fused Disconnect Switch	1.00	ea	$ 1,183.00	$ 1,426.00		$ 2,609.00
						U0 Disconnect WP 30A	5.00	ea	$ 467.00	$ 892.00		$ 1,359.00
						U5 Disconnect WP 600A	1.00	ea	$ 3,011.00	$ 1,782.00		$ 4,793.00
						U0 Disconnect 30A	23.00	ea	$ 2,148.00	$ 4,099.00		$ 6,247.00
						U4 Disconnect 400A	1.00	ea	$ 1,183.00	$ 1,426.00		$ 2,609.00
						F1 Disconnect 30A	1.00	ea	$ 94.00	$ 179.00		$ 273.00
						F7 Disconnect 100A	1.00	ea	$ 358.00	$ 535.00		$ 893.00
			26 27 26.11 General-Use-Switches, Dimmer Switches and Fan Speed Controllers Switches									$ -
						Included in section 26 09 23						$ -
			26 27 26.33 General-Grade Duplex Straight Blade Receptacles									$ -
						Wll.Mnt Receptacle	149.00	ea	$ 14,642.00	$ 21,773.00		$ 36,415.00
						Floor.Mnt Receptacle	25.00	ea	$ 28,481.00	$ 36,042.00		$ 64,523.00
			26 27 26.37 Receptacles w/ Arc-Fault and Ground-Fault Protective Devices									$ -
						Included in section 26 27 26.33						$ -
			26 27 26.51 Connectors, Cords, and Plugs									$ -
						Included in 26 27 26.33						$ -
			26 28 13 Fuses									$ -
						Included in 26 24 16						$ -
			26 29 23 Variable-Frequency Motor Controllers									$ -
						Install Only	4.00	ea		$ 2,450.00		$ 2,450.00
			26 29 33 Controllers for Fire Pump Drivers									$ -
						Provide Disconnects to FACP and Sprinkler Pump	2.00	ea	$ 500.00	$ 750.00		$ 1,250.00
			26 33 23.11 Central Battery Equipment for Emergency Lighting									$ -
						Provide 10kW Inverter System	1.00	ea	$ 1,183.00	$ 3,208.00		$ 4,391.00
			26 36 00 Transfer Switches								$ 12,000.00	$ 12,000.00
						Manual Transfer Switch 500A	1.00	ea	$ 667.00	$ 3,653.00		$ 4,320.00

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						Manual Transfer Switch 30A	1.00	ea	$ 198.00	$ 892.00		$ 1,090.00
						Manual Transfer Switch 600A	1.00	ea	$ 773.00	$ 4,277.00		$ 5,050.00
			26 41 13 Lightning Protection for Structures									$ -
						Lighting Protection					$ 28,300.00	$ 28,300.00
						250MCM Bare Cable Below Grade	281.00	lf	$ 2,369.00	$ 1,609.00		$ 3,978.00
						Down Lead Conductor	15.00	ea	$ 430.00	$ 1,925.00		$ 2,355.00
						Roof Ground Conductor	47.00	ea	$ 1,338.00	$ 6,030.00		$ 7,368.00
						Grounding Wire	3,000.00	lf	$ 9,515.00	$ 6,830.00		$ 16,345.00
			26 43 13 Surge Protective Devices for Low-Voltage Electrical Power Circuits									$ -
						Included in 26 24 13						$ -
			26 51 19 LED Interior Lighting								$ 519,528.00	$ 519,528.00
						F1 Recessed 4" Dia.	54.00	ea	$ 2,437.00	$ 12,029.00		$ 14,466.00
						F1A Recessed 4" Dia.	54.00	ea	$ 2,437.00	$ 12,029.00		$ 14,466.00
						F2 Recessed 4" Adjustable Downlight	69.00	ea	$ 3,120.00	$ 15,370.00		$ 18,490.00
						F2A Recessed 4" Adjustable Downlight	3.00	ea	$ 135.00	$ 669.00		$ 804.00
						F6 Recessed 3" Linear LED	515.00	lf	$ 4,425.00	$ 23,402.00		$ 27,827.00
						F7 Surface Mount Linear	99.00	lf	$ 850.00	$ 4,545.00		$ 5,395.00
						F8 Recessed 2 3/8" Linear	84.00	lf	$ 713.00	$ 3,818.00		$ 4,531.00
						F8A Recessed 2 3/8" Linear	98.00	lf	$ 850.00	$ 4,545.00		$ 5,395.00
						F10 Surface Mnt. 4.5"W x 4.3"H x 48"L LED	26.00	ea	$ 1,050.00	$ 5,098.00		$ 6,148.00
						F10A Wll. Mnt. 4.5"W x 4.3"H x 48"L LED	8.00	ea	$ 323.00	$ 1,569.00		$ 1,892.00
						F12 Surface Mnt. 2.6"Wx4.25"Hx48"L	8.00	ea	$ 323.00	$ 1,569.00		$ 1,892.00
						F13 Surface. Mnt. 4.5"Wx4.3"Hx48"L	9.00	ea	$ 363.00	$ 1,764.00		$ 2,127.00
						F16 (Furniture Mount Fixtures)	10.00	ea	$ 297.00	$ 1,337.00		$ 1,634.00
						F17 4" Dia x 4' Tall Translucent LED Cylinder	18.00	ea	$ 1,841.00	$ 5,934.00		$ 7,775.00
						F18 Surface Mnt 2"W Stair LED	95.00	lf	$ 811.00	$ 4,317.00		$ 5,128.00

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						F19 Perimeter recessed 2.5" W Linear	95.00	lf	$ 811.00	$ 4,317.00		$ 5,128.00
						FK/EM Emergency Elevator Shaft Fixture	1.00	ea	$ 38.00	$ 179.00		$ 217.00
						Exit Sign	20.00	ea	$ 1,717.00	$ 9,090.00		$ 10,807.00
			26 52 13 Emergency and Exit Lighting									$ -
						Emergency and exit lighting (Included in section 26 51 19)						$ -
			26 56 19 LED Exterior Lighting									$ -
						Exterior Lighting					$ 37,665.00	$ 37,665.00
						F11 Wll. Mnt. 16"W x 10"H x 16"L LED	6.00	ea	$ 708.00	$ 4,042.00		$ 4,750.00
						X1 W.Recessed LED Exterior	4.00	ea	$ 152.00	$ 713.00		$ 865.00
						X2 W.Recssd LED Downlight	2.00	ea	$ 92.00	$ 447.00		$ 539.00
						X2A Flag Pole Lighting	1.00	ea	$ 320.00	$ 1,426.00		$ 1,746.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 660,002.00**	**$ 1,389,825.00**	**$ 877,493.00**	**$ 2,927,320.00**
		DIVISION 27 - COMMUNICATIONS										
			27 05 26 Grounding and Bonding for Communications Systems									$ -
						Grounding Bar	3.00	ea	$ 150.00	$ 300.00		$ 450.00
						Grounding Backbone to telecom grounding bar	950.00	lf	$ 3,200.00	$ 5,200.00		$ 8,400.00
						Conductor to main grounding bar	300.00	lf	$ 1,200.00	$ 2,200.00		$ 3,400.00
			27 05 29 Hangers and Supports for Communications Systems									$ -
						Included in 26 05 33.13						$ -
			27 05 33 Conduits and Backboxes for Communications Systems									$ -
						Included in 26 05 33.13						$ -
			27 05 36 Cable Trays for Communications Systems									$ -
						Cellar IT Room 18" Cable Tray	26.00	lf	$ 874.00	$ 1,158.00		$ 2,032.00
			27 05 44 Sleeves and Sleeve Seals for Communications Pathways and Cabling									$ -
						IT Room Sleeves	12.00	ea	$ 6,155.00	$ 4,277.00		$ 10,432.00
			27 05 53 Identification for Communications Systems									$ -

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						Cable ID at Patch Panel	3.00	ea	$ 1,342.00	$ 2,139.00		$ 3,481.00
			27 08 00 Commissioning of Communications									$ -
						Commissioning of Communications	3.00	day		$ 5,000.00		$ 5,000.00
			27 11 16 Communications Cabinets, Racks, Frames, and Enclosures								$ 49,000.00	$ 49,000.00
						IT Data Racks	3.00	ea	$ 1,342.00	$ 2,139.00		$ 3,481.00
						Plywood Backboard	3.00	ea	$ 165.00	$ 1,500.00		$ 1,665.00
			27 11 19 Communications Termination Blocks and Patch Panels									$ -
						Rack Patch Panels	3.00	ea	$ 1,342.00	$ 2,139.00		$ 3,481.00
			27 11 23 Communications Cable Management and Ladder Rack									$ -
						Cable ties	20.00	ea	$ 25.00	$ 250.00		$ 275.00
						18" Ladder Rack	18.00	lf	$ 605.00	$ 803.00		$ 1,408.00
			27 11 26 Communications Rack Mounted Power Protection and Power Strips									$ -
						Included in 27 05 26						$ -
			27 15 13 Communications Copper Horizontal Cabling									$ -
						Cat. 6A Cabling for AV/Security/TT Equipment	9,000.00	lf	$ 11,384.00	$ 24,057.00		$ 35,441.00
			27 15 43 Communications Faceplates and Connectors									$ -
						Wll.Mnt Data Outlet	89.00	ea	$ 2,169.00	$ 9,040.00		$ 11,209.00
						Flr.Mnt. Data Box	3.00	ea	$ 3,482.00	$ 4,325.00		$ 7,807.00
						Ceiling Projector Outlet	1.00	ea	$ 25.00	$ 102.00		$ 127.00
						Ceiling Camera Outlet	21.00	ea	$ 512.00	$ 2,132.00		$ 2,644.00
			27 21 33 Data Communications Wireless Access Points									$ -
						Wireless Access Point	21.00	ea	$ 1,828.00	$ 6,550.00		$ 8,378.00
			27 41 16 Integrated Audio-Video Systems and Equipment								$ 140,000.00	$ 140,000.00
						AV System: Furnish and install devices. Power cable and conduit by EC and Comm Cable by Telecom.						$ -
						ADA01 Service Desk Induction Loop	3.00	ea	$ 5,000.00	$ 6,400.00		$ 11,400.00
						AVP01 AV Floor box Plate	3.00	ea	$ 3,482.00	$ 6,325.00		$ 9,807.00

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						CP01 AV Control Touch Panel	3.00	ea	$ 2,650.00	$ 8,050.00		$ 10,700.00
						ER01 AV Rack Full Height	1.00	ea	$ 2,204.00	$ 6,506.00		$ 8,710.00
						ER02 AV Rack Credenza	2.00	ea	$ 1,500.00	$ 3,000.00		$ 4,500.00
						FPD01 Flat Panel Display 75"	1.00	ea	$ 3,378.00	$ 1,892.00		$ 5,270.00
						FPD02 Flat Panel Display 55"	6.00	ea	$ 8,350.00	$ 5,277.00		$ 13,627.00
						FPD03 Flat Panel Display 85"	1.00	ea	$ 4,350.00	$ 5,320.00		$ 9,670.00
						PJS01 Motorized Projection Screen	1.00	ea	$ 280.00	$ 902.00		$ 1,182.00
						SPK01 Ceiling Recessed Speaker	6.00	ea	$ 890.00	$ 2,139.00		$ 3,029.00
						SPK02 Wall Speaker	4.00	ea	$ 890.00	$ 2,139.00		$ 3,029.00
						SPK03 Clng. Speaker	28.00	ea	$ 4,299.00	$ 9,980.00		$ 14,279.00
						VPJ01 Video Protector Screen	1.00	ea	$ 242.00	$ 802.00		$ 1,044.00
						WP01 AV Wall Plate	2.00	ea	$ 78.00	$ 402.00		$ 480.00
						WP02 AV Wall Plate	3.00	ea	$ 150.00	$ 505.00		$ 655.00
						Ceiling People Counter	2.00	ea	$ 78.00	$ 402.00		$ 480.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 73,621.00**	**$ 133,352.00**	**$ 189,000.00**	**$ 395,973.00**
		DIVISION 28 - ELECTRONIC SAFETY AND SECURITY										
			28 00 10 Supplemental Requirements for Electronic Safety and Security									$ -
						Supplemental requirements for electronic safety and security (Included in Division 28)				$ 5,000.00		$ 5,000.00
			28 13 00 Access Control Software and Database Management								$ 45,000.00	$ 45,000.00
						Security System Software and Installation with Start-up/Owner Training	1.00	ea		$ 5,000.00		$ 5,000.00
			28 15 00 Integrated Access Control Hardware Devices									$ -
						Elec. Lockset	11.00	ea		$ 10,415.00		$ 10,415.00
						Elec. Hinge	11.00	ea		$ 10,415.00		$ 10,415.00
						Door Contact	14.00	ea		$ 10,415.00		$ 10,415.00
			28 15 11 Integrated Credential Readers and Entry Management									$ -
						Card Reader	12.00	ea	$ 1,741.00	$ 6,415.00		$ 8,156.00

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			28 15 13 Access Control Credentials									$ -
						Included in 28 15 00						$ -
			28 15 19 Access Control Remote Devices									$ -
						Included in 28 15 00						$ -
			28 15 23 Intercom Entry Systems								$ 25,000.00	$ 25,000.00
						Remote Intercom	1.00	ea	$ 450.00	$ 2,000.00		$ 2,450.00
						Master Intercom	1.00	ea	$ 450.00	$ 2,000.00		$ 2,450.00
			28 20 00 Video Surveillance								$ 210,000.00	$ 210,000.00
						Video surveillance						$ -
						Wall/Clng Interior Camera	17.00	ea	$ 1,699.00	$ 6,530.00		$ 8,229.00
						Bullet Camera	2.00	ea	$ 250.00	$ 898.00		$ 1,148.00
						Elevator Camera	1.00	ea	$ 135.00	$ 515.00		$ 650.00
						360 Deg. Camera Dome	16.00	ea	$ 1,700.00	$ 6,600.00		$ 8,300.00
						Exterior Camera	4.00	ea	$ 506.00	$ 2,050.00		$ 2,556.00
						People Counter	2.00	ea	$ 500.00	$ 898.00		$ 1,398.00
			28 31 00 Intrusion Detection									$ -
						Motion Sensor	3.00	ea	$ 150.00	$ 300.00		$ 450.00
						Intrusion Detection Keypad	1.00	ea	$ 50.00	$ 165.00		$ 215.00
						Audible Siren	1.00	ea	$ 50.00	$ 165.00		$ 215.00
			28 31 21 Area and Perimeter Intrusion Detection									$ -
						Duress Alarm	4.00	ea	$ 150.00	$ 1,650.00		$ 1,800.00
						Glass Break Sensor	5.00	ea	$ 500.00	$ 1,720.00		$ 2,220.00
												$ -
			28 46 21.11 Addressable Fire-alarm Systems								$ 70,000.00	$ 70,000.00
						Fire Alarm (Conduit by EC)						$ -
						Commissioning	1.00	lot		$ 10,000.00		$ 10,000.00

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						Ceiling Mount Horn/Strobe	15.00	ea	$ 519.00	$ 6,200.00		$ 6,719.00
						Wll.Mnt Horn. Strobe	5.00	ea	$ 150.00	$ 1,708.00		$ 1,858.00
						Ceiling Mount Strobe	19.00	ea	$ 559.00	$ 6,490.00		$ 7,049.00
						Pull Station	8.00	ea	$ 199.00	$ 2,187.00		$ 2,386.00
						Area Smoke Detector	9.00	ea	$ 266.00	$ 2,919.00		$ 3,185.00
						Elevator Smoke Detector	2.00	ea	$ 56.00	$ 649.00		$ 705.00
						Combo SD and CO Detector	2.00	ea	$ 60.00	$ 683.00		$ 743.00
						Tamper Switch	15.00	ea	$ 872.00	$ 11,245.00		$ 12,117.00
						Water Flow Switch	4.00	ea	$ 232.00	$ 3,100.00		$ 3,332.00
						FSD Connection	22.00	ea	$ 1,743.00	$ 11,271.00		$ 13,014.00
						Communication Cable	9,480.00	lf	$ 13,616.00	$ 22,540.00		$ 36,156.00
						#10 MI Cable	4.00	clf	$ 8,000.00	$ 10,000.00		$ 18,000.00
						#10G Grounding Wire (Conduit by EC)	3.00	clf	$ 155.00	$ 358.00		$ 513.00
						Provide new fire alarm control panel and integrate	1.00	lot	$ 1,200.00	$ 8,538.00		$ 9,738.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 35,958.00**	**$ 171,039.00**	**$ 350,000.00**	**$ 556,997.00**
		DIVISION 31 - EARTHWORK										
			31 00 00 Earthwork									$ -
						Earth excavation Depth 15'	6,622.00	$/sf	$ 210,000.00	$ 200,000.00	$ 300,000.00	$ 710,000.00
			31 09 00 Geotechnical Instrumentation and Monitoring of Earthwork									$ -
						Monitor adjacent buildings' movement during construction						$ -
						Buildings	180.00	lf		$ 5,000.00		$ 5,000.00
												$ -
			31 23 19 Dewatering									$ -
						Dewatering (Included in section 31 00 00)						$ -
			31 25 00 Erosion and Sedimentation Controls									$ -
						Stabilized construction entrance	1,200.00	sf	$ 12,000.00	$ 800.00	$ 2,200.00	$ 15,000.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						8' High plywood construction fence around site	360.00	lf				$ -
						Silt fence	180.00	lf	$ 1,000.00	$ 5,000.00	$ 500.00	$ 6,500.00
												$ -
			31 50 00 Excavation Support and Protection									$ -
						Timber Lagging System North side and East side						$ -
						15'-0" high	2,700.00	sf	$ 288,000.00	$ 25,000.00	$ 182,000.00	$ 495,000.00
			31 66 16 Special Foundation Walls									$ -
					A,B/FO-201	Secant pile walls (boring/drilling)	83.00	EA	$ 448,000.00	$ 618,000.00	$ 429,000.00	$ 1,495,000.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 959,000.00**	**$ 853,800.00**	**$ 913,700.00**	**$ 2,726,500.00**
		DIVISION 32 - EXTERIOR IMPROVEMENTS										
			32 01 10 Temporary Tree and Plant Protection									$ -
						Temporary tree and plant protection (Included in section 32 93 00)						$ -
			32 12 16 Asphalt Paving									$ -
						Full section pavement next to new curbing	950.00	SF	$ 800.00	$ 1,000.00	$ 2,000.00	$ 3,800.00
						Remove Pavement	5,100.00	sf	$ 500.00	$ 2,000.00	$ 4,000.00	$ 6,500.00
						Haul off site	68.27	cy	$ 500.00	$ 1,000.00	$ 2,000.00	$ 3,500.00
						Disposal cost (clean fill)	138.25	tons	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 8,000.00
						Re-surfaced section pavement	4,500.00	SF	$ 20,000.00	$ 8,000.00	$ 4,000.00	$ 32,000.00
			32 13 13 Concrete Paving									$ -
						Concrete sidewalks - 4"	2,130.00	SF	$ 4,000.00	$ 20,000.00	$ 6,000.00	$ 30,000.00
						Concrete sidewalks -7"	510.00	SF	$ 4,000.00	$ 14,000.00	$ 5,000.00	$ 23,000.00
						Concrete sidewalks - 4" (restore neighboring concrete)	395.00	SF	$ 948.00	$ 2,350.25		$ 3,298.25
						NYC Standard curbing (NYSDOT 609.0251)	190.00	LF	$ 10,000.00	$ 8,000.00	$ 7,200.00	$ 25,200.00
						Bike Rack (new)	2.00	ea	$ 6,400.00	$ 3,000.00		$ 9,400.00
						DOT bench(by others)						$ -
			32 14 00 Unit Paving									$ -

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Stone pavers, 1 1/2" thick on setting bed	550.00	sf	$ 15,000.00	$ 10,000.00	$ 5,000.00	$ 30,000.00
						Permeable granite block paver strip (6"w x 15"long x 4" thick)	530.00	sf	$ 15,000.00	$ 9,500.00	$ 5,000.00	$ 29,500.00
			32 93 00 Plants						$ 2,150.00			$ 2,150.00
						4" Caliper Trees - onsite	3.00	ea	$ 1,935.00	$ 4,515.00		$ 6,450.00
						5 ft x 10 ft tree pit (NYCDPR)	3.00	ea	$ 1,935.00	$ 4,515.00		$ 6,450.00
						4" Caliper Trees - pay into park tree fund - off site	4.00	ea	$ 2,580.00	$ 6,020.00		$ 8,600.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 87,748.00**	**$ 96,900.25**	**$ 43,200.00**	**$ 227,848.25**
		DIVISION 33 - UTILITIES										
			33 05 19 Ductile-Iron Utility Pipe									$ -
						3" Domestic water service (includes trenching and backfill)	40.00	lf	$ 4,000.00	$ 18,000.00	$ 1,600.00	$ 23,600.00
						Connection to existing public water line	1.00	ea	$ 3,000.00	$ 4,000.00	$ 1,000.00	$ 8,000.00
						Shut-off valve - 3" gate valve	1.00	ea	$ 3,000.00	$ 3,000.00	$ 1,000.00	$ 7,000.00
						6" Fire service (includes trenching and backfill)	40.00	lf	$ 2,000.00	$ 20,000.00	$ 1,000.00	$ 23,000.00
						Connection to existing public water line	1.00	ea	$ 5,000.00	$ 1,000.00	$ 1,000.00	$ 7,000.00
						Shut-off valve - 6" gate valve	1.00	ea	$ 1,900.00	$ 1,500.00	$ 1,000.00	$ 4,400.00
												$ -
						8" Combined sewer service (includes trenching and backfill)	30.00	lf	$ 4,000.00	$ 21,689.00	$ 4,000.00	$ 29,689.00
						Connection to existing public sewer line	1.00	ea	$ 1,000.00	$ 7,000.00	$ 1,500.00	$ 9,500.00
												$ -
						6" Storm service (includes trenching and backfill)	30.00	lf	$ 4,000.00	$ 20,000.00	$ 4,000.00	$ 28,000.00
						Connection to existing public storm line	1.00	ea	$ 1,000.00	$ 7,000.00	$ 1,500.00	$ 9,500.00
												$ -
						Slotted drain at surface along property line (assume stainless steel)	90.00	lf	$ 3,000.00	$ 1,000.00	$ 500.00	$ 4,500.00
			33 90 00 Other Utilities									$ -
						2" Gas service (includes trenching and backfill)	20.00	lf	$ 500.00	$ 2,500.00	$ 800.00	$ 3,800.00
						Connection to existing public gas line	1.00	ea	$ 500.00	$ 2,400.00		$ 2,900.00

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						Shut-off valve - 6" gas valve	1.00	ea	$ 1,500.00	$ 2,400.00		$ 3,900.00
												$ -
						Electric service (including trenching, backfilling and concrete encasement)	20.00	lf	$ 500.00	$ 2,500.00	$ 800.00	$ 3,800.00
						Service end box (connect to existing public electric service)	1.00	ea	$ 1,000.00	$ 3,500.00		$ 4,500.00
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL			**$ 35,900.00**	**$ 117,489.00**	**$ 19,700.00**	**$ 173,089.00**
		DIVISION 34 - TRANSPORTATION										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 35 - WATERWAY AND MARINE CONSTRUCTION										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 40 - PROCESS INTEGRATION										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 41 - MATERIAL PROCESSING AND HANDLING EQUIPMENT										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 42 - PROCESS HEATING, COOLING, AND DRYING EQUIPMENT										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 44 - POLLUTION AND WASTE CONTROL EQUIPMENT										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 45 - INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 46 - WATER AND WASTEWATER EQUIPMENT										
												$ -
		copy above cell and insert copied cell above the row										
						SUB TOTAL						
		DIVISION 48 - ELECTRICAL POWER GENERATION										
												$ -
		copy above cell and insert copied cell above the row										

Department of Design and Construction

CONTRACTOR'S DETAILED BID BREAKDOWN FORM

Project ID: LQQ122-RG

Project Name: Rego Park Library New Facility (GC Large PQL)

Name of the Bidder: Stalco Construction Inc

Hard Cost Estimate (Level 2)

No.	Sub Work (*)	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No)	Description:	Qty	Unit:	Total Cost of Material $:	Total Cost of Labor $:	Total Cost of Equipment $:	Grand total of Material,Labor & Eqp.$:
						SUB TOTAL						
						Hard Cost:			$ 11,286,486.00	$ 13,221,009.99	$ 3,484,274.72	$ 27,970,770.70
						Hard Cost Summary(Including General Requirement):						$ 31,801,931.75

Note:

1. Bidders' total material,labor, and equipment costs are fully-loaded with markups
2. Quanity includes expected material wastage
3. (*) Identify possible Sub Contract Work items
4. Shaded cell is where data must be entered

Pre-Award Process

The bidder is advised that as part of the pre-award review of its bid, it may be required to submit the information described in Sections (A) through (D) below. If required, the bidder must submit such information within five (5) business days following receipt of notification from DDC that it is among the low bidders. Such notification from DDC will be by email and will specify the types of information which must be submitted directly to DDC.

In the event the bidder fails to submit the required information within the specified time frame, its bid may be rejected as nonresponsive.

****

(A) **Project Reference Form**: If required, the bidder must complete and submit the Project Reference Form set forth in this Bid Booklet. The Project Reference Form consists of 3 parts: (1) Contracts Completed by the Bidder, (2) Contracts Currently Under Construction by the Bidder, and (3) Pending Contracts Not Yet Started by the Bidder.

(B) **Copy of License**: If required, the bidder must submit a copy of the license under which the bidder will be performing the work. Such license must clearly show the following: (1) Name of the Licensee, (2) License Number, and (3) Expiration date of the License. A copy of the license will be required from bidders for the following contracts: Plumbing Work, Electrical Work and Asbestos Abatement.

(C) **Financial Information**: If required, the bidder must submit the financial information described below:

(1) Audited Financial Statements: Financial statements (Balance Sheet and Income Statement) of the entity submitting the bid, as audited by an independent auditor licensed to practice as a certified public accountant (CPA). Audited financial statements for the three most recent fiscal years must be submitted. Each such financial statement must include the auditor's standard report.

If the bidder does not have audited financial statements, it must submit an affidavit attesting to the fact that the bidder does not have such statements. In addition, the bidder must submit the following documentation covering the three most recent fiscal years: signed federal tax returns, unaudited financial statements, and a "certified review letter" from a certified public accountant (CPA) verifying the unaudited financial statements.

Unless the most recent audited or unaudited financial statement was issued within ninety (90) days, the bidder must submit interim financial information that includes data on financial position and results of operation (income data) for the current fiscal year. Such information may be summarized on a monthly or quarterly basis or at other intervals.

(2) Schedule of Aged Accounts Receivable, including portion due within ninety (90) days.

(D) **Project Specific Information**: If required, the bidder must submit the project specific information described below:

(1) Statement indicating the number of years of experience the bidder has had and in what type of construction.

(2) Resumes of all key personnel to be involved in the project, including the proposed project superintendent.

(3) List of significant pieces of equipment expected to be used for the contract, and whether such equipment is owned or leased.

(4) Description of work expected to be subcontracted, and to what firms, if known.

(5) List of key material suppliers.

(6) Preliminary bar chart time schedule

(7) Contractor's expected means of financing the project. This should be based on the assumption that the contractor is required to finance 2X average monthly billings throughout the contract period.

(8) Any other issues the contractor sees as impacting his ability to complete the project according to the contract.

In addition to the information described in Sections (A) through (D) above, the bidder must submit such additional information as the Commissioner may require, including without limitation, an additional bid breakdown file which is detailed to the CSI Section level, coordinated with the Contract specifications, as well as an explanation or justification for specific unit price items.

The bidder is further advised that it may be required to attend a pre-award meeting with DDC representatives. If such a meeting is convened, the bidder will be advised as to any additional material to be provided.

See Work Completed List

Project References

A. Contracts completed by the bidder

List all contracts substantially completed within the last 4 years, up to a maximum of 10, in descending order of date of substantial completion.

Project & Location	Contract Type	Contract Amount ($000)	Date Completed	Owner Reference & Tel. No.	Architect/Engineer Reference & Tel. No. (if different from owner)

General Contractors ● Construction Management

WORK COMPLETED

Suffolk County DPW - Fire Rescue Building Improvements - Phase 2 102 East Ave., Yaphank, NY 11980		**$290,300.00**
Owner: Suffolk County DPW	Contract #:	**22/0124LPWI**
335 Yaphank Ave., Yaphank, NY 11980	Stalco #:	2209
Contact: Kenneth Phalen (631) 852-4222		
Construction Manager:		
Contact:		
Architect: Nelson & Pope	Award Date:	May 2022
Contact:	Completed:	

Plainedge UFSD - Plainedge Middle School Freestanding Courtyard Greenhouse 200 Stewart Ave., Bethpage, NY 11714		**$361,000.00**
Owner: Plainedge UFSD	Contract #:	20-008
241 Wyngate Dr., N. Massapequa, NY 11758	Stalco #:	2121
Contact: (516) 992) 7458		
Construction Manager: N/A		
Contact:		
Architect: MDS	Award Date:	July 2021
Contact: Michael Mark	Completed:	August 2021

Locust Valley CSD - Elevator Addition at Bayville Primary School 50 Godfrey Ave., Bayville, NY 11790		**$564,000.00**
Owner: Locust Valley CSD	Contract #:	**SED # 28-05-003-06-0-009-012**
22 Horse Hollow Rd., Locust Valley, NY 11560	Stalco #:	2120
Contact:		
Construction Manager: N/A		
Contact:		
Architect: Campbell Cassetta Architects PC	Award Date:	July 2021
Contact: Robert Brown (631) 587-1984	Completed:	May 2022

Harborfields CSD - Library Renovations at Harborfields High School 98 Taylor Ave., Greenlawn, NY 11740		**$357,000.00**
Owner: Harborfields CSD	Contract #:	**SED# 58-04-06-06-0-001-030**
2 Oldfield Rd., Greenlawn, NY 11740	Stalco #:	2118
Contact:		
Construction Manager: Triton Construction Co.		
Contact: George Leeman		
Architect: BBS	Award Date:	June 2021
Contact:Steve Walsh (631) 475-0349	Completed:	December 2021

1316 Motor Parkway Islandia, NY 11749
Phone: (631) 254-6767 ~ Fax (631) 254-8015
estimating@stalcoconstruction.com

Elwood UFSD - Bond Phase 2 & 3 Building Improvements at Various Schools Base Bid GC-1 **$2,002,000.00**
Various

Owner: Elwood UFSD Contract #: BBS Project Nos. 19-111 (GHS Ph. 3),1.9-113 (BIS Ph. 3),1.9-11,4 (HnS Ph.3), and L8-178 (EMS Ph. 2), 18-180 (HI'S Ph.2)
100 Kenneth Ave., Greenlawn, NY 11740 Stalco #: 2114
Contact:
Construction Manager: Park East
Contact: Christine DaSilva
Architect: BBS Architects Award Date: May 2021
Contact: Peter Dawkins Completed: February 2022

Hauppauge UFSD - Middle School & High School Site & Bathroom Renovations **$1,128,000.00**
Various

Owner: Hauppauge UFSD Contract #: SED# 58-05-06-03-0-008-049 SED# 58-05-06-03-0-002-031
495 Hoffman Lane, Hauppauge, NY 11788 Stalco #: 2111
Contact: Jacaueline Pirro (631) 761-8211
Construction Manager: Triton
Contact: George Leeman
Architect: BBS Architects Award Date: May 2021
Contact: Steve Walsh (631) 475-0349 Completed: June 2022

Carl Place UFSD - Cherry Lane Elementary School Exterior Wall & Classroom Renovations **$983,300.00**
475 Roslyn Ave., Carle Place, NY 11514

Owner: Carle Place UFSD Contract #: SED# 28-0-11-03-0-003-024
168 Cherry Lane, Carle Place, NY 11514 Stalco #: 2110
Contact: Kevin Coffey
Construction Manager: Advanced Construction Group
Contact: Frank Marino
Architect: H2M Architects + Engineers Award Date: March 2020
Contact: Jason Smith (631) 756-8000 Completed: September 2021

Oceanside UFSD - 2020-2021 CIP - Oceanside High School **$981,437.00**
145 Merle Ave., Oceanside, NY 11572

Owner: Oceanside UFSD Contract #: SED#: 28-02-11-03-0-008-038
145 Merle Ave., Oceanside, NY 11572 Stalco #: 2108
Contact:
Construction Manager: N/A
Contact:
Architect: JAG Award Date: April 2021
Contact: Robert Cascone Completed: March 2022

Nassau BOCES - Exterior Upgrades at George Farber Administrative Center **$628,000.00**
71 Clinton Rd., Garden City, NY 11530

Owner: Nassau BOCES Contract #: SED# 28-90-00-00-1-137-007 SED# 28-90-00-00-1-137-008
71 Clinton Rd., Garden City, NY 11530 Stalco #: 2105
Contact: (516) 396-2500
Construction Manager: N/A
Contact:
Architect: H2M Architects + Engineers Award Date: April 2021
Contact: David Sherland Completed: March 2022

West Hempstead UFSD - Rebid - Various Locations **$658,000.00**
Various

Owner: West Hempstead UFSD Contract #: **SED #28-02-27-03-0-004-013 SED #28-02-27-03-0-001-022 SED #28-02-27-03-0-005-033**
252 Chestnut St., West Hempstead, NY 11552 Stalco #: 2103
Contact:
Construction Manager: SCC
Contact: Vincent Pacheco
Architect: Tetra Tech Award Date: March 2021
Contact: Ervin Hall Completed: May 2022

Baldwin UFSD - Elevator Addition at Plaza Elementary School **$967,300.00**
501 Seaman Ave., Baldwin, NY 11510

Owner: Baldwin UFSD Contract #: **SED #28-02-10-03-0-007-024**
960 Hastings St., Baldwin, NY 11510 Stalco #: 2102
Contact: Jason Smith (631) 756-8000
Construction Manager: H2M
Contact: Stefan D. Reiss
Architect: H2M Architects + Engineers Award Date: March 2021
Contact: Jason Smith (631) 756-8000 Completed: May 2022

Connetquot CSD - Phase 3 - Cherokee-Slocum- Press Box **$886,000.00**
Various

Owner: Connetquot CSD Contract #: **SED#58-05-07-06-0-004-032 SED#58-05-07-06-0-012-029 SED#58-05-07-06-7-025-001**
780 Ocean Ave., Bohemia, NY 11716 Stalco #: 2101
Contact:
Construction Manager: N/A
Contact:
Architect: JAG Award Date: March 2021
Contact: John Grillo (631) 476-2161 Completed: September 2022

SUCF - SUNY Downstate Medical Center - Construct Infrastruture Riser BSB **$3,924,400.00**
450 Clarkson Ave., Brooklyn, NY

Owner: State University Construction Fund Contract #: **141056-00**
State University Plaza, 353 Broadway, Albany, NY 12246 Stalco #: 2013
Contact: Magaret McSorley (518) 320-1710
Construction Manager: Ellana
Contact: Steve Bereznitsky
Architect: Lothrop Associates Award Date: September 2020
Contact: Thomas McDermott Completed: March 2022

DASNY - Broad Channel Athletic Club Storage Building **$2,339,534.00**
125 Crossbay Blvd., Broad Channel, NY 11693

Owner: DASNY Contract #: **3277109999**
515 Broadway, Albany, NY 12207 Stalco #: 2001
Contact: Malik Dokku
Construction Manager: N/A
Contact:
Architect: H2M Architects + Engineers Award Date: April 2020
Contact: Completed: August 2020

Sysosset CSD - Fitness Center Addition at Syosset High School 70 South Woods Rd., Syosset, NY 11791		**$3,000,036.00**
Owner: Syosset CSD	Contract #:	**SED# 28-05-02-06-0-010-049**
99 Pell Lane, Syosset, NY 11791	Stalco #:	1921
Contact: Greg Hamilton (516) 364-5600		
Construction Manager: Park East Construction Corp.		
Contact:		
Architect: H2M	Award Date:	July 2019
Contact: (631) 756-8000	Completed:	

West Babylon UFSD - Phase 4 & 5 Bond Projects Various		**$1,723,010.00**
Owner: West Babylon UFSD	Contract #:	**SED# 58-01-02-03-0-003-020** **SED# 58-01-02-03-0-001-032** **SED# 58-01-02-03-0-001-033** **SED# 58-01-02-03-0-005-022** **SED# 58-01-02-03-0-008-025**
200 Old Farmingdale Rd., West Babylon, NY 11704	Stalco #:	1917
Contact: (631) 3746-7701		
Construction Manager: SCC		
Contact:		
Architect: BBS	Award Date:	May 2019
Contact: Karalisa	Completed:	December 2019

Hicksville UFSD - 2017/2018 Capital Improvement Program - East St. ES 50 East Street, Hicksville, NY 1181		**$326,195.82**
Owner: Hicksville UFSD	Contract #:	28-05-17-03-0-003-030
200 Division Ave., Hicksville, NY 11801	Stalco #:	1911
Contact:		
Construction Manager: Park East Construction		
Contact:		
Architect: JAG	Award Date:	April 2019
Contact: John Grillo 631-476-2161 jmgrillo@jagarchitect.com	Completed:	September 2019

Island Park UFSD - Structural Slab Repairs at Francis X. Hegarty ES 100 Radcliffe Road, Island Park, NY 11558		**$789,429.94**
Owner: Island Park UFSD	Contract #:	28-02-31-02-0-001-012
99 Radcliffe Road, Island Park, NY 11558	Stalco #:	1906
Contact:		
Construction Manager: N/A		
Contact:		
Architect: BBS Architects	Award Date:	March 2019
Contact: Steve Walsh (631) 475-0349 swalsh@bbsarch.com	Completed:	September 2019

Merrick UFSD - Districtwide A/C Upgrades & Classroom Toilet Room Renovations Various		**$1,920,000.00**
Owner: Merrick UFSD	Contract #:	CB-1
21 Babylon Rd., Merrick, NY 11566	Stalco #:	1904
Contact: (516) 992-7260		
Construction Manager: N/A		
Contact:		

Architect: BBS — Award Date: February 2019
Contact: (631) 475-0349 — Completed: March 2020

Port Washington UFSD - Security Entry Vestibules & Interior Reconstruction at Various Schools — **$1,388,500.00**
Port Washington, NY 11050

Port Washington UFSD — Contract #: S.E.D. NO. 28-04-04-03-0-010-028, 28-04-04-03-0-005-026, 28-04-04-03-0-003-027, 28-04-04-03-0-008-006, 28-04-04-03-0-001-038, 28-04-04-03-0-007-026
90 Avenue C, Port Washington, NY 11050 — Stalco #: 1902
Contact:
Construction Manager: School Construction Constultants
Contact: (631) 567-0200
Architect: BBS — Award Date: March 2019
Contact: (631) 475-0349 — Completed: August 2020

Northport-East Northport UFSD - Bond Issue Related Capital Improvement Program Phase 2 - Rebid — **$220,674.00**
Northport, NY 11768

Owner: Northport-East Northport UFSD — Contract #: SED 58-04-04-03-0-002-017, 58-04-04-03-0-004-021
158 Laurel Ave., Northport, NY 11768 — Stalco #: 1901
Contact:
Construction Manager: N/A
Contact:
Architect: JAG — Award Date: January 2019
Contact: John Grillo (631) 476-2161 — Completed: November 2020

Bridgehampton UFSD - Bond Issue Related Capital Improvement Program at Elementary & High School — **$18,540,300.00**
2685 Montauk Hwy., Bridgehampton, NY 11932

Owner: Bridgehampton UFSD — Contract #: SED 58-09-09-02-0-001-016
2685 Montauk Hwy., Bridgehampton, NY 11932 — Stalco #: 1824
Contact:
Construction Manager: N/A
Contact:
Architect: JAG — Award Date: October 2018
Contact: John Grillo (631) 476-2161 — Completed: June 2021

Suffolk County Community College - Kreiling Hall Renovation — **$7,161,550.00**
533 College Rd., Selden, NY 11784

Owner: Suffolk County Community College — Contract #: 19-CC-024
533 College Rd., Selden, NY 11784 — Stalco #: 1821
Contact: (631) 451-4112
Construction Manager: N/A
Contact:
Architect: WFC — Award Date: October 2018
Contact: Bill Brady (631) 689-8450 — Completed: September 2019

Bayport-Blue Point UFSD - District Wide Security Vestibules — **$297,524.00**
Bayport-Blue Point, NY

Owner: Bayport-Blue Point UFSD — Contract #: 58–05–05–02–0–004-021, 58-05-05-02-0-011-014, 58-05-05-02-0-002-016, 58-05-05-02-0-001-016, 58-05-05-02-0-006-012
189 Academy St., Bayport, NY 11705 — Stalco #: 1810

Contact: (631) 472-7860
Construction Manager: Park East Construction
Contact: (631) 549-9800
Architect: BBS Award Date: March 2018
Contact: (631) 475-0349 Completed: October 2019

Three Village CSD - 2016/17 & 2017/18 Capital Improvement Program at Various Schools **$2,265,000.00**
Stony Brook, NY 11790

Owner: Three Village CSD Contract #: SED 58-02-01-06-0-002-031, 58-02-01-06-0-006-031, 58-02-01-06-0-007-030, 58-02-01-06-0-008-039, 58-02-01-06-0-008-040, 58-02-01-06-0-014-030, 58-02-01-06-0-015-036
100 Suffolk Ave., Stony Brook, NY 11790 Stalco #: 1812
Contact:
Construction Manager: N/A
Contact:
Architect: JAG Award Date: March 2018
Contact:(631) 476-2161 Completed: October 2018

Bayport-Blue Point UFSD - Bond Phase 3 - Bldg. & Site Improvements at Various Schools **$561,782.00**
Bayport, NY 11705

Owner: Bayport-Blue Point UFSD Contract #: SED 58-05-05-02-0-002-017, 58-05-05-02-0-001-019, 58-05-05-02-0-006-014
189 Academy St., Bayport, NY 11705 Stalco #: 1818
Contact:
Construction Manager: Park East Construction
Contact: (631) 549-9800
Architect: BBS Award Date: August 2018
Contact: (631) 475-0349 Completed: November 2019

East Rockaway UFSD - FEMA Grant Rebid **$2,218,675.00**
East Rockaway, NY 11518

Owner: East Rockaway UFSD Contract #: SED 28-02-19-03-0-001-037, 28-02-19-03-0-002-014, 28-02-19-03-0-004-002
443 Ocean Ave., East Rockaway, NY 11518 Stalco #: 1805
Contact:
Construction Manager: N/A
Contact:
Architect: JAG Award Date: February 2018
Contact: John Grillio (631) 476-2161 Completed: May 2020

Bronx Community College - Campus Wide Utility Upgrade Phase IV **$19,290,708.00**
Project Address

Owner: Bronx Community College Contract #: ES-GSN-0728
Address Stalco #: 1519
Contact:
Construction Manager: N/A
Contact:
Architect: RCM Technologies Award Date: January 2016
Contact: Bill White (516) 404-5517 Completed: May 2019

SUNY Farmingdale - Whitman Hall Lower Level Renovations **$2,376,217.00**

2350 Broadhollow Rd., Farmingdale, NY 11735

Owner: SUNY Farmingdale — Contract #: T000458
2350 Broadhollow Rd., Farmingdale, NY 11735 — Stalco #: 1802
Contact: Erika Murray (631) 420-2017
Construction Manager: N/A
Contact:
Architect: H2M — Award Date: January 2018
Contact: Timothy Schultz (631) 756-8000 — Completed: November 2019

Farmingville Fire District - Station #2 Concrete Apron & Snow Melt System — **$376,717.71**
1080 Portion Road, Farmingville, NY 11738

Owner: Farmingdale Fire District — Contract #: 1
780 Horseblock Road, Farmingville, NY 11738 — Stalco #: 1823
Contact:
Construction Manager: N/A
Contact:
Architect: MJG Architecture — Award Date: October 2018
Contact: Tom Zarcone (631) 849-5852 — Completed: June 2019

Great Neck Digester - Pre-Engineered Building — **$301,929.00**
236 East Shore Road, Great Neck, NY 11023

Great Neck Water Pollution Control District — Contract #: 18022-13120
6 H Enterprise Drive, East Setauket, NY 11733 — Stalco #: 1822
Contact: John Martirano - WHM (631) 473-3568
Construction Manager: N/A
Contact:
Architect: N/A — Award Date: October 2018
Contact: — Completed: April 2020

Middle Country CSD - Dawnwood Middle School Renovations Phase 2 — **$2,483,009.11**
10 43rd Street, Centereach, NY 11720

Owner: Middle Country School District — Contract #: 58-02-11-06-0-008-023
8-43rd Street, Centereach, NY 11720 — Stalco #: 1817
Contact:
Construction Manager: Park East Construction
Contact: Derrick Knatz 631-549-9800 dknatz@parkeastconstruct.com
Architect: H2M — Award Date: June 2018
Contact: Joseph Mile 631-756-8000 jmile@h2m.com — Completed: May 2019

Connetquot CSD - 2018/2018 Capital Improvement Program at Connetquot HS — **$198,949.00**
190 7th Street, Bohemia, NY 11716

Owner: Connetquot CSD — Contract #: 58-05-07-06-0-007-037
780 Ocean Ave., Bohemia, NY 11716 — Stalco #: 1820
Contact:
Construction Manager: N/A
Contact:
Architect: JAG — Award Date: September 2018
Contact: John Grillo 631-476-2161 jmgrillo@jagarchitect.com — Completed: August 2019

Island Park UFSD - Localized Mitigation Improvements at Lincoln Orens MS — **$968,200.00**
150 Trafalgar Blvd., Island Park, NY 1158

Owner: Island Park UFSD — Contract #: 28-02-31-02-0-002-010
99 Radcliffe Road, Island Park, NY 11558 — Stalco #: 1813
Contact: Marie Donnelly, Business Official
Construction Manager: N/A
Contact:
Architect: BBS Architects — Award Date: March 2018
Contact: Steve Walsh (631) 475-0349 swalsh@bbsarch.com — Completed: August 2019

Herricks UFSD - Cafeteria & Kitchen Renovations and New Comfort Station at Herricks' High School — **$2,557,811.00**
New Hyde Park, NY 11040

Herricks UFSD — Contract #: SED 28-04-09-03-0-008-034, 28-04-09-03-7-018-001
999-B Herricks Rd., New Hyde Park, NY 11040 — Stalco #: 1814
Contact: (516) 305-8903
Construction Manager: Park East Construction
Contact: (631) 549-9800
Architect: BBS — Award Date: April 2018
Contact: (631) 475-0349 — Completed: February 2019

Rocky Point UFSD - Bond Issue Related Capital Improvments at Various Schools — **$2,041,331.00**
Rocky Point, NY

Rocky Point UFSD — Contract #: SED 58-02-09-02-0-001-015, 58-02-09-02-0-005-034, 58-02-09-02-0-006-019
90 Rocky Point Rd., Rocky Point, NY 11778 — Stalco #: 1815
Contact:
Construction Manager: N/A
Contact:
Architect: JAG — Award Date: May 2018
Contact: John Grillo (631) 476-2161 — Completed: September 2018

Southold UFSD - Library & Computer Lab Renovations at Southold Elementary School — **$456,964.00**
Oaklawn Ave., Southold, NY 11971

Owner: Southold UFSD — Contract #: SED 58-10-05-02-0-014-005
420 Oaklawn Ave., Southold, NY 11971 — Stalco #: 1816
Contact: (631) 765-5400
Construction Manager: School Construction Consultants
Contact:
Architect: BBS — Award Date: June 2017
Contact: (631) 475-0349 — Completed: February 2018

SUNY Stony Brook - Keller College Stair Renovation — **$821,164.29**
Roosevelt Drive, Stony Brook, NY 11794

Owner: SUNY Stony Brook — Contract #: 18/19-051MC
1500 Stony Brook Road, Stony Brook, NY 11794 — Stalco #: 1825
Contact: Marie Titone, Contract Officer (631) 632-6066
Construction Manager: N/A
Contact:
Architect: D&B — Award Date: November 2018
Contact: Chris Desmond (914) 467-5300 cdesmond@db-eng.com — Completed: September 2019

North Merrick UFSD - Capital Improvement Project Phase 1A at Various Schools — **$1,318,000.00**

Fayette Elementary School & Old Mill Elementary School - North Merrick, NY

Owner: North Merrick UFSD — Contract #: 28-02-29-02-0-001-027 / 28-02-29-02-0-002-024
1057 Merrick Ave, North Merrick, NY 11566 — Stalco #: 1706
Contact:
Construction Manager: N/A
Contact:
Architect: JAG — Award Date: April 2017
Contact: John Grillo 631-476-2161 jmgrillo@jagarchitect.com — Completed: November 2018

MTA Long Island Railroad - New Wyandanch Station Building Construction — **$6,101,423.82**
Corner of Straight Path & Long Island Ave., Wyandanch, NY

Owner: MTA Long Island Railroad — Contract #: 6268
144-41 94th Ave., 3rd Floor, MC 0335, Jamaica, NY 11435 — Stalco #: 1717
Contact: Jigna Patel (347) 494-6112
Construction Manager: N/A
Contact:
Architect: Keller Sandgren Associates — Award Date: October 2017
Contact: — Completed: June 2020

South Huntington Public Library - Interior Renovations — **$332,972.00**
145 Pidgeon Hill Rd, South Huntington, NY 11746

Owner: South Huntington Public Library — Contract #: 1
145 Pidgeon Hill Rd, South Huntington, NY 11746 — Stalco #: 1720
Contact:
Construction Manager: Park East Construction Corp.
Contact: Kevin Castrova 516-644-1472 kcastrova@parkeastconstruction.com
Architect: Beatty Harvey Coco — Award Date: December 2017
Contact: Christopher Sepp 631-300-1010 x127 christopher@bhc-architects.com — Completed: November 2018

Bellmore UFSD - Reinhard Early Childhood Center - Alterations to Existing Buildings — **$765,000.00**
2750 South St. Marks Ave, Bellmore, NY 11710

Owner: Bellmore UFSD — Contract #: 28-02-07-02-0-003-021
580 Winthrop Ave, Bellmore, NY 11710 — Stalco #: 1806
Contact:
Construction Manager: Park East Construction Corp.
Contact: Kevin Castrova 516-644-1472 kcastrova@parkeastconstruction.com
Architect: Wiedersum Associates — Award Date: February 2018
Contact: 631-434-7900 — Completed: September 2018

Mastic Beach Ambulance Headquarters - New Construction — **$5,217,600.00**
343 Neighborhood Rd, Mastic Beach, NY

Owner: Town of Brookhaven — Contract #: 20170059
One Independence Hill, Farmingville, NY 11738 — Stalco #: 1713
Contact: Geri Manzilillo 631-451-6252
Construction Manager: L.K. McLean Associates, P.C.
Contact: Chris Dwyer 631-286-8668 cdwyer@lkma.com
Architect: L.K. McLean Associates, P.C. — Award Date: August 2017
Contact: Chris Dwyer 631-286-8668 cdwyer@lkma.com — Completed: September 2018

Deer Park UFSD - 2015 Bond Issue Related Capital Improvement Program Phase 2 @ Various Schools **$1,655,144.00**
May Moore ES, John Q. Adams ES, Robert Frost MS - Deer Park, NY

Owner: Deer Park UFSD Contract #: 58-01-07-03-0-004-034 58-01-07-03-0-007-027 58-01-07-03-0-008-033
1881 Deer Park Ave, Deer Park, NY 11729 Stalco #: 1804
Contact:
Construction Manager: SCC (School Construction Consultants)
Contact: Steve Gianniotis 347-680-6879
Architect: JAG Award Date: January 2018
Contact: John Grillo 631-476-2161 jmgrillo@jagarchitect.com Completed: September 2018

Rocky Point UFSD - Bond Issue Related Capital Improvement Program Phase 2 at Various Schools **$904,796.00**
Joseph A. Edgar Intermediate School, Rocky Point High School - Rocky Point, NY

Owner: Rocky Point UFSD Contract #: 58-02-09-02-0-001-014 58-02-09-02-0-005-032
90 Rocky Point - Yaphank Rd, Rocky Point, NY 11778 Stalco #: 1719
Contact:
Construction Manager: Park East Construction Corp.
Contact: Derrick Knatz 631-549-9800 dknatz@parkeastconstruct.com
Architect: JAG Award Date: November 2017
Contact: John Grillo 631-476-2161 jmgrillo@jagarchitect.com Completed: September 2018

Middle Country CSD - Stagecoach Elementary School Interior & Exterior Renovations **$350,000.00**
205 Dare Rd, Selden, NY 11784

Owner: Middle Country CSD Contract #: 58-02-11-06-0-012-013
8 43rd St, Centereach, NY 11720 Stalco #: 1715
Contact:
Construction Manager: Park East Construction
Contact: Sean Corrigan 631-549-9800
Architect: H2M Award Date: June 2017
Contact: Joseph Mile 631-756-8000 Completed: September 2018

Wantagh UFSD - 2016/2017 Capital Improvement Program - Middle School Cafeteria **$144,855.00**
3299 Beltagh Ave., Wantagh, NY 11793

Owner: Wantagh UFSD Contract #: 28-02-23-03-0-006-023
3301 Beltagh Ave., Wantagh, NY 11793 Stalco #: 1808
Contact:
Construction Manager: N/A
Contact:
Architect: JAG Award Date: February 2018
Contact: John Grillo 631-476-2161 jmgrillo@jagarchitect.com Completed: August 2018

Mattituck-Cutchogue UFSD - Pole Barn at Jr/Sr HS **$117,787.00**
15125 Main Road, Mattituck, NY 11952

Owner: Mattituck-Cutchogue UFSD Contract #: 58-10-12-02-0-021-001
385 Depot Lane, Cutchogue, NY 11935 Stalco #: 1807
Contact:
Construction Manager: N/A
Contact:
Architect: JAG Award Date: February 2018
Contact: John Grillo 631-476-2161 jmgrillo@jagarchitect.com Completed: July 24, 2018

Stony Brook Radiology Exterior Stairwell Renovation Stony Brook Medicine		**$880,000.00**
Owner: SUNY at Stony Brook 101 Nicholls Rd, Stony Brook, NY 11794 Contact: Ed Mercurio 631-444-6638 **Construction Manager:** N/A Contact: **Architect: Stantech** Contact: 631-424-8600	Contract #: Stalco #: Award Date: Completed:	T20071 1707 April 2017 May 2018
Babylon UFSD - Kitchen & Service Line Reconstruction 50 Railroad Avenue, Babylon, NY 11702		**$438,700.00**
Owner: Babylon UFSD 50 Railroad Avenue, Babylon, NY 11702 Contact: Peter R. Daly 631-893-7914 **Construction Manager: School Construction Consultants** Contact: Tony Campinella 631-848-0714 **Architect: BBS** Contact: 631-475-0349	Contract #: Stalco #: Award Date: Completed:	58-01-01-03-0-001-020 1704 March 2017 October 2017
North Shore CSD - Bond Referendum Phase III Sea Cliff ES/Glenwood Landing ES/North Shore HS/High School Maintence Garage		**$376,000.00**
Owner: North Shore CSD 112 Franklin Avenue, Sea Cliff, New York 11579 Contact: John Hall 516-277-7800 **Construction Manager: Savin Engineer, P.C.** Contact: Frank Szatkowski 914-769-3200 **Architect: BBS** Contact: 631-475-0349	Contract #: Stalco #: Award Date: Completed:	28-05-01-06-0-005-018 28-05-01-06-0-003-023 28-05-01-06-0-004-032 28-05-01-06-2-012-031 1703 March 2017 October 2017
Southampton Elementary School - Kindergarten Bathroom Renovation 30 Pine St, Southampton, NY 11968		**$135,502.00**
Owner: Southampton UFSD 70 Leland Lane, Southampton, New York 11968 Contact: 631-591-4700 **Construction Manager: N/A** Contact: **Architect: BBS** Contact: Jim Wegdig 631-475-0349	Contract #: Stalco #: Award Date: Completed:	58-09-06-03-0-001-030 1701 March 2017 October 2017
Southampton Intermediate School - Locker Room Renovation & Café Ceiling Replacement 70 Leland Lane, Southampton, NY 11968		**$695,194.00**
Owner: Southampton UFSD 70 Leland Lane, Southampton, New York 11968 Contact: 631-591-4700 **Construction Manager: N/A** Contact: **Architect: BBS** Contact: Jim Wegdig 631-475-0349	Contract #: Stalco #: Award Date: Completed:	58-09-06-03-0-003-024 1702 March 2017 October 2017
BMCC - Pool Deck Restoration		**$5,397,000.00**

199 Chambers Street, New York, New York 10007

Owner: DASNY	Contract #:	3128509999
1 Penn Plaza, New York, New York 10119-0098	Stalco #:	1507
Contact: Peter Jackson 212-273-5000		
Construction Manager: N/A		
Contact: N/A		
Architect: N/A	Award Date:	March 2015
Contact: N/A	Completed:	October 2017

Massapequa UFSD - Berner Middle School Science Lab Upgrades & Masonry Restoration **$740,490.00**
4925 Merrick Road, Massapequa, NY 11758

Owner: Massapequa UFSD	Contract #:	28-05-23-03-0-011-028
4925 Merrick Road, Massapequa, NY 11758	Stalco #:	1711
Contact:		
Construction Manager: School Construction Consultants, Inc.		
Contact: Mike Sweeney 631-495-5261		
Architect: H2M	Award Date:	June 2017
Contact: 631-756-8000	Completed:	September 2017

Roslyn UFSD - Bus Garage Demo **$32,438.00**
475 Round Hill Road, Roslyn Heights, NY

Owner: Roslyn UFSD	Contract #:	28-04-03-03-5-004-006
P.O. Box 367, Roslyn Heights, NY 11577	Stalco #:	1613
Contact: Kevin Carpenter 516-801-5450 kcarpenter@roslynschools.org		
Construction Manager:		
Contact:		
Architect: Kaeyer, Garment & Davidson Architects, PC	Award Date:	July 2016
Contact: Kevin Carpenter 516-801-5450	Completed:	August 2017

SUNY Optometry - Lobby Renovation **$4,495,000.00**
33 West 42nd Street, New York, New York

Owner: State University Construction Fund	Contract #:	41050
State University Plaza, 353 Broadway, Albany, New York 12246	Stalco #:	1430
Contact: Simon Stein 518-320-3230 Simon.Stein@suny.edu		
Construction Manager: Ellana Inc. Construction Consultants		
Contact: Steve Beriznitsky 347-371-2137		
Architect: Kliment Halsband Architects	Award Date:	January 2015
Contact: Ms. Nathalie Westervelt 212-243-7400	Completed:	March 2017

SUNY at Stony Brook - Benedict Quad Renovations **$3,138,980.00**
Stony Brook, New York 11790

Owner: State University of New York	Contract #:	T001961
State University Plaza, Albany, New York 12246	Stalco #:	1608
Contact: Peter Gerace 631-632-4772 peter.gerace@stonybrook.edu		
Construction Manager:		
Contact: John Sparano 631-254-6767		
Architect: WCF Architects	Award Date:	April 2016
Contact: Neil Macdonald 631-689-845	Completed:	January 2017

SUNY Stony Brook - Starbucks at Melville Library **$1,231,200.00**
100 Nicolls Road, Stony Brook, New York 11794

Owner: State University of New York	Contract #:	T001983

State University Plaza, Albany, New York 12246 800-342-3811 — Stalco #: 1615
Contact: SBU Alumi Association John Fogarty 631-632-3077 john.fogarty@stonybrook.edu
Construction Manager: Stony Brook Alumni Association
Contact: John Fogarty 631-632-3077
Architect: iKon Architects — Award Date: September 2016
Contact: Charlie Maira 609-919-0099 — Completed: January 2017

Farmingdale State College - SUNY School of Business — **$19,417,864.00**
2350 Broad Hollow Rd, Farmingdale, NY
Owner: **State University Construction Fund** — Contract #: T005998
State University Plaza, 353 Broadway, Albany, NY 12246 — Stalco #: 1214
Contact: 518-320-3200
Construction Manager: N/A
Contact:
Architect: **Urbahn Architects** — Award Date: September 2014
Contact: 212-239-0220 — Completed: January 2017

Elmhurst New Branch Library — **$23,288,312.00**
86-01 Broadway, Elmhurst, NY
Owner: Queens Public Library — Contract #: 20101421440
Customer Address: 89-11 Merrick Rd, Jamaica, NY 11432 — Stalco #: 1011
Contact Name / Number: Zia Dawood 917-346-8865
Construction Manager: DDC
Contact: Mario Siriban 347-203-1255
Architect: Marpillero Pollak Architects — Award Date: May 2010
Contact: Sandiz Marpillero 212-619-5560 — Completed: December 2016

CA - Driven Local — **$291,303.00**
1 Computer Associates Plaza, Ste. #105, Islandia, NY 11749
Owner: CA Technologies — Contract #: 3000279523/1616
1 Computer Associates Plaza, Islandia, NY 11749 — Stalco #: 1614
Contact: Dave Mastrella 631-342-3563
Construction Manager: N/A
Contact:
Architect: BLD — Award Date: July 2016
Contact: (631) 580-2100 — Completed: November 2016

Bellmore-Merrick CSD - Bond Referendum Projects Phase III — **$918,000.00**
W.C. Mepham HS/S.H.Calhon HS/JFK HS/Grand Avenue MS/ Merrick Avenue MS
Owner: Bellmore - Merrick CSD — Contract #: 28-02-53-07-007-037
1260 Meadowbrook Road, North Merrick, New York 11566 — Stalco #: 1602
Contact: 516-992-1000
Construction Manager: School Construction Consultants
Contact: 631-567-0200
Architect: BBS — Award Date: January 2016
Contact: Roger Smith 631-475-0349 — Completed: September 2016

H.O. Penn - Holtsville Parts Department Renovation — **$108,850.00**
660 Union Avenue, Holtsville, New York 11742
Owner: H.O. Penn Machinery Co., Inc. — Contract #: W0000/ELIHV2TS527696-1
15 Middle Avenue, Holtsville, New York 11742 — Stalco #: 1606

Contact: Tristen Schaper 631-654-4454 tschaper@hopenn.com
Construction Manager: N/A
Contact: N/A
Architect: Roseberry Architectural Studio Award Date: June 2016
Contact: 631-730-1262 Completed: September 2016

East Hampton UFSD - Capital Improvements **$518,972.00**
John Marshal Elementary/ East Hampton MS/ East Hampton HS

Owner: Board of Education, East Hampton UFSD Contract #: 58-0301-02-0-004-018 58-0301-02-0-003-021 58-0301-02-0-006-027
East Hampton, New York 11749 Stalco #: 1605
Contact: 631-329-4100
Construction Manager: N/A
Contact: N/A
Architect: MJG Architecture Award Date: April 2016
Contact: Mike Guido 631-849-5852 Completed: August 2016

Freeport UFSD Auditorium Upgrade at FHS **$634,539.00**
50 South Brookside Avenue, Freeport, New York 11520

Owner: Freeport UFSD Contract #: 28-02-09-3-0-001-030
235 North Ocean Avenue, Freeport, New York 11520 Stalco #: 1512
Contact: Thomas Fucci
Construction Manager: N/A
Contact: N/A
Architect: BJLJ Engineers & Architects, P.C. Award Date: June 2016
Contact: Thomas Fucci Completed: August 2016

Mount Sinai Hospital - Parking Lot **$2,546,211.00**
23-11 30th Road, Queens, New York

Owner: Mount Sinai Hospital Contract #: X772.20
23-11 30th Road, Queens, New York Stalco #: 1411
Contact: 718-932-1000
Construction Manager: Mount Sinai Medical Center
Contact: Jeremiah Laureano 646-5920816
Architect: Custodio Consulting LLC Award Date: August 2014
Contact: 212-683-6170 Completed: August 2016

Oceanside UFSD - Capital Improvements Program - High School **$112,000.00**
145 Merle Avenue, Oceanside, New York 11572

Owner: Oceanside UFSD Contract #: 28-02-11-03-0-008-029
145 Merle Avenue, Oceanside, New York 11572 Stalco #: 1609
Contact: 516-678-1200
Construction Manager: N/A
Contact: N/A
Architect: JAG Award Date: May 2016
Contact: John Grillo 631-476-2161 Completed: August 2016

Oysterponds Elementary School - Window Replacement Phase III **$535,000.00**
23405 Main Rd, Orient, NY, 11957

Owner: Oysterpond Elementary School Contract #: GC-1
23405 Main Rd, Orient, NY, 11957 Stalco #: 1610

Contact: 631-323-2410
Construction Manager: N/A
Contact: N/A
Architect: BHC, LLP Award Date: June 2016
Contact: Richard Malone 631-323-2410 Completed: August 2016

Nassau University Medical Center - Primary Care **$3,064,000.00**
2201 Hempstead Turnpike, East Meadow, New York 11564
Owner: Nassau University Medical Center Contract #: MC98-12173-5147
2201 Hempstead Turnpike, East Meadow, New York 11564 Stalco #: 1319
Contact: Fara Tabaei
Construction Manager: SCC Construction Management Group
Contact: Nick Amoruso 516-790-0594
Architect: Fletcher Thompson Award Date: January 2014
Contact: 212-695-4767 Completed: February 2016

Nassau BOCES - Rosemary Kennedy Center - Pool Area **$65,800.00**
2850 North Jerusalem Road, Wauntagh, New York 11793
Owner: Nassau BOCES - Board of Cooperative Educational Services Contract #: 14/15-058
71 Clinton Road, Garden City, New York Stalco #: 1432
Contact: Christopher Graham
Construction Manager:
Contact:
Architect: H2M Award Date: 2014
Contact: Andrew Martin 631-756-8000 Ext. 1339 Completed: November 2015

Pier A - Phase III Core & Shell General Contracting **$17,167,950.00**
22 Battery Place, New York, NY 10004
Owner: Battery Park City Authority Contract #: 10-2037
200 Liberty St, 24th Floor, New York, NY 10281 Stalco #: 1022
Contact: Gwen Dawson 212-417-4304
Construction Manager: The Liro Group
Contact: Jaio Maraj 212-248-0481 marajj@liro.com
Architect: H3 Hardy Collaboration Architecture Award Date: August 2010
Contact: Ivy Zoretic 212-677-6030 Completed: December 2014

Battery Park Community Center **$10,816,859.00**
345 Chambers St., Battery Park City
Owner: Battery Park City Authority Contract #: 10-1996
200 Liberty St, 24th Floor, New York, NY 10281 Stalco #: 1003
Contact: Gwen Dawson 212-417-4304
Construction Manager: Liro Program & Construction Management, P.C.
Contact: Anthony Buquicchio 212-786-1090
Architect: Liro Architects Award Date: April 2010
Contact: Anthony Buquicchio 212-786-1090 Completed: 2013

Erasmus Hall High School **$11,400,000.00**
911 Flatbush Ave, Brooklyn, NY
Owner: NYC School Construction Authority Contract #: C000010679
Address: 30-30 Thomson Ave, Long Island City, NY 11101 Stalco #: 0741
Contact Name / Number: Jacobie Ricard 718-472-8000

Construction Manager: NYC School Construction Authority
Contact: Jacobie Ricard 718-472-8000
Architect: BJLJ Engineers & Architects, P.C. Award Date: January 2008
Contact: Jugal Pandya 516-741-2222 Completed: 2012

Manorhaven Beach Pool Complex **$12,176,251.00**
Manorhaven Blvd, Port Washington, NY
Owner: Town of North Hempstead - Dept. of Public Works Contract #: 07-11R
285 Denton Ave, New Hyde Park, NY 11040 Stalco #: 1018
Contact: 516-739-6710
Construction Manager: Cameron Engineering & Associates
Contact: Kevin McAndrew 516-827-4900
Architect: **Notaro Grupp Architects** Award Date: July 2010
Contact: John Notaro, Scott Grupp 516-609-8700 Completed: December 2010

Three Village CSD - Bond Issue Related Capital Improvement Phase III **$30,000,000.00**
Nassakeag ES, Arrowhead ES, Ward Melville HS
Owner: Three Village Central School District Contract #: 58-02-01-06-0-002-022 58-02-01-06-0-007-021 58-02-01-06-0-009-032
100 Suffolk Ave, Stony Brook, NY 11790 Stalco #: 903
Contact Name / Number: 631-730-4010
Construction Manager: School Construction Consultants
Contact: Paul Adamo 631-567-0200
Architect: John A. Grillo Architects Award Date: January 2009
Contact: John M. Grillo 631-476-2161 jmgrillo@jagarchitect.com Completed: September 2010

CA - Lewis Johs **$295,000**
Baldassano Architecture
Alew Bakdamenti 631.830.0282
Completed in 2016

SUNY Farmingdale School of Business **$18,900,000**
Urbahn Architects
Deborah Verne 212.239.0220
Completed in 2016

White Top Mountain Medical and Research Building **$5,000,000**
NF Architectural Designs
516.627.3300
Completed in 2016

Brooklyn Bridge Park Management and Community Building **$3,600,000**
Architecture Research Office
Megumi Tamanaha 212.675.1870
Completed in 2015

Liebeskind USA, Inc. **$350,000**
L2 Studios, Inc.
Boyd Joyner 407.648.8888
Completed in 2015

Riverhead Charter School **$14,100,000**
BBS Architects, Landscape Architects and Engineers

Karlisa Grundner 631.475.0349
Completed in 2015

Catheterization Laboratory at Nassau University Medical Center **$815,000**
DiGroup Architecture
Robert Ryan 646.584.8419
Completed in 2014

Lincoln Medical and Mental Health Center Emergency Department **$5,200,000**
Perkins Eastman Architects
Kenneth Easton 646.225.6227
Completed in 2014

Long Beach High School **$16,500,000**
CS Arch
Dana Hochberg 518.463.8068
Completed in 2014

SUNY Stony Brook MRI Suite **$5,800,000**
Aecom
Jongmin Lee 212.366.6200
Completed in 2014

Vaughn College of Aeronautics and Technology **$24,000,000**
John Ciardullo Associates, P.C.
Richard Piacentini 212.245.0010
Completed in 2014

Health Sciences Library at Nassau University Medical Center **$700,000**
Ehasz Giacalone Architects
Louis Giacalone 516.420.8383
Completed in 2013

SUNY Optometry **$1,858,780**
Perkins Eastman
Richard Rappaport 646.225.6275
Completed in 2013

SUNY Stony Brook University Computing Center **$2,500,000**
Newport Engineering
Samantha Spano 516.922.2672
Completed in 2013

Computer Associates **$592,000**
BLD Architecture
Tom Murzawski 631.580.2100
Completed in 2012 (We have done various projects at CA over the past few years)

Deer Park Fire District **$150,000**
Cashin Associates
Joe Iannucci 631.348.7600
Completed in 2012

Manorhaven Beach Pool Complex **$12,000,000**
Cameron Engineering & Associates
Joyce He 516.827.4900

Completed in 2012

Miller Place Union Free School District **$2,000,000**
Michael J. Guido Architect
Mike Guido 631.617.1301
Completed in 2012

Patchouge - Medford Library **$537,562**
H2M Architechts
Joseph Mile 631.694.4122
Completed in 2011

East Quogue Fire District **$360,000**
Frank G. Relf Architects
William Quintanilla 631.271.4432
Completed in 2009

Holy Sepluchre Cemetery Building **$2,700,000**
Burton, Behrendt, Smith Architecture
Karalisa Grundner 631.475.0349
Completed in 2009

Scully Estates Suffolk County Environmental Education & Interpretive Center **$723,000**
Peter Caradonna Architecture
Christine Caruso 631.689.1120
Completed in 2009

Western Suffolk BOCES **$159,627**
James M. Cambell Architects
Ralph Cassetta 631.587.1984
Completed in 2009

Springs Youth Center **$1,300,000**
L.K. McLean Associates, P.C.
Matthew Jedlicka 631.286.8668
Completed in 2008

Tanner Park Beach Complex **$1,000,000**
Sidney B. Bowne & Son, LLP
Joseph Todaro 516.746.2350
Completed in 2008

Kings Park High School **$10,100,000**
H2M Architects
Joseph Mile 631.694.4122
Completed in 2007

See "VRQ Att B - Uncompleted Construction Contracts"

B. Contracts currently under construction by the bidder

List all contracts currently under construction even if they are not similar to the contract being awarded.

Project & Location	Contract Type	Contract Amount ($000)	Subcontracted to Others ($000)	Uncompleted Portion ($000)	Date Scheduled to Complete	Owner Reference & Tel. No.	Architect/ Engineer Reference & Tel. No. (if different from owner)

NEW YORK STATE
VENDOR RESPONSIBILITY QUESTIONNAIRE
ATTACHMENT B - UNCOMPLETED CONSTRUCTION CONTRACTS

Vendor Name: Stalco Construction, Inc. **NYS Vendor ID:** 1000038099

Question 3.1: **List all current uncompleted construction contracts:**

1	Agency/Owner NYS OGS-Pilgrim Psych Center-Rehabilitate Nurses Station Bldg. 81 & 82 GC (2315)				Award Date 10/27/23		Completion Date
	Contact Person		Telephone No.	Designer Architect and/or Design Engineer N/A			
	Contract No. 46053-C	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A	
			Total Contract Amount $9,480,000.00	Amount Sublet to Others		Uncompleted Amount $8,547,455.90	
2	Agency/Owner Bethpage Water District - Wellhouse 7 & 8 Roof Replacements & Improvements (2318)				Award Date 08/24/23		Completion Date
	Contact Person		Telephone No. 631-756-8000	Designer Architect and/or Design Engineer H2M Architects + Engineers			
	Contract No. H2M Project #BPWD2105	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A	
			Total Contract Amount $674,000.00	Amount Sublet to Others		Uncompleted Amount $159,730.00	
3	Agency/Owner Trans DEV Services D/B/A NICE BUS Interior Renovation at The Rosa Parks Hempstead Transit Center (2319)				Award Date 10/26/23		Completion Date
	Contact Person		Telephone No. 516-294-1666	Designer Architect and/or Design Engineer JRS Architect			
	Contract No. V-2135	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A	
			Total Contract Amount $1,816,000.00	Amount Sublet to Others		Uncompleted Amount $738,778.82	
4	Agency/Owner DASNY - Conversion & Remediation Project at Creedmore Addicion Treatment Ctr.- Bld.19 (2320)				Award Date 01/10/24		Completion Date
	Contact Person		Telephone No. 631-756-8000	Designer Architect and/or Design Engineer H2M Architects + Engineers			
	Contract No. D225084	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A	
			Total Contract Amount $8,656,000.00	Amount Sublet to Others		Uncompleted Amount $7,503,200.00	
5	Agency/Owner Brentwood UFSD Phase 1- Pine Park ES,North ES Reconstruction (2323)				Award Date 11/17/23		Completion Date
	Contact Person		Telephone No. 631-847-7762	Designer Architect and/or Design Engineer Tetra Tech Architects & Engineers			
	Contract No. SED#:58-05-12-03-0-008-013 SED#:58-05-12-03-0-013-012 SED#:58-05-12-03-0-019-013	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A	
			Total Contract Amount $458,000.00	Amount Sublet to Others		Uncompleted Amount $92,980.00	

6	Agency/Owner SUNY Farmingdale-Partial Renovation of University Police Headquaters (2324)				Award Date 12/16/23	Completion Date
	Contact Person		Telephone No. 631-756-8000	Designer Architect and/or Design Engineer H2M Architects + Engineers		
	Contract No. D-102323	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A
			Total Contract Amount $2,295,600.00	Amount Sublet to Others		Uncompleted Amount $1,878,920.47
7	Agency/Owner Cutchogue Fire District- New Fire Department Building (2326)				Award Date 12/05/23	Completion Date
	Contact Person Ray Nemschick		Telephone No. 631-563-2130	Designer Architect and/or Design Engineer Nemschick Silverman		
	1-GC	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A
			Total Contract Amount $8,656,000.00	Amount Sublet to Others		Uncompleted Amount $7,503,200.00
8	Agency/Owner Freeport UFSD - Unit Ventilator Replacement at Freeport Senior H.S. (2327)				Award Date 12/06/23	Completion Date
	Contact Person		Telephone No. 631-756-8000	Designer Architect and/or Design Engineer H2M Architects + Engineers		
	Contract No. #28-02-09-03-0-001-044	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A
			Total Contract Amount $1,288,000.00	Amount Sublet to Others		Uncompleted Amount $479,938.00
9	Agency/Owner SCDPW- Improvements to Suffolk County Farm Schrader House/Visiters Center REBID (2403)				Award Date 01/31/24	Completion Date
	Contact Person		Telephone No.	Designer Architect and/or Design Engineer		
	Contract No. CP-1796#1	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A
			Total Contract Amount $1,250,000.00	Amount Sublet to Others		Uncompleted Amount $1,177,500.00
10	Agency/Owner Cold Spring Harbor CSD 2019 Bond Issue-Phase 3 & 2021 & 2022 Capitol Improvement Program at Multiple Schools. (2404)				Award Date 01/30/24	Completion Date
	Contact Person		Telephone No. 631-476-2161	Designer Architect and/or Design Engineer John A. Grillo Architect (JAG)		
	Contract No. 1B GC	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A
			Total Contract Amount $608,000.00	Amount Sublet to Others		Uncompleted Amount $135,995.20
11	Agency/Owner Great Neck UFSD Interior and Exterior Building Repairs (2414)				Award Date 02/27/24	Completion Date
	Contact Person		Telephone No.	Designer Architect and/or Design Engineer		
	Contract No.	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A			EIN of JV, if applicable N/A
			Total Contract Amount $1,142,000.00	Amount Sublet to Others		Uncompleted Amount $460,500.00

12	Agency/Owner Amityville Public Libraray --Additions & Alterations (2409)				Award Date 03/20/24	Completion Date
	Contact Person John Tanzi		Telephone No. 631-751-0108	Designer Architect and/or Design Engineer John tanzi Architects		
	Contract No. GCC	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $5,782,000.00	Amount Sublet to Others	Uncompleted Amount $4,886,729.26	
13	Agency/Owner Trans DEV Services D/B/A NICE BUS - HVAC Data Center Project (2410)				Award Date 04/17/24	Completion Date
	Contact Person 516-364-4140		Telephone No.	Designer Architect and/or Design Engineer Gannet Fleming		
	Contract No. V- 2215A	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $362,000.00	Amount Sublet to Others	Uncompleted Amount $343,900.00	
14	Agency/Owner Uniondale UFSD - Building Additions & Interior Alterations at Turtle Hook Middle School (2303)				Award Date 02/10/23	Completion Date
	Contact Person John LaBare - Director of Facilities & Operatic		Telephone No. 516-560-8815	Designer Architect and/or Design Engineer H2M Architects + Engineers		
	Contract No. SED#: 28-02-02-03-0-010-036	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $9,077,000.00	Amount Sublet to Others	Uncompleted Amount $377,528.82	
15	Agency/Owner Uniondale UFSD - District Wide Vestibules Contracts G1 through G8 (2311)				Award Date 05/09/23	Completion Date
	Contact Person John LaBare - Director of Facilities & Operatic		Telephone No. 516-560-8815	Designer Architect and/or Design Engineer H2M Architects + Engineers		
	Contract No.	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
	SED#: 28-02-02-03-0-006-036 SED#: 28-02-02-03-0-007-040 SED#: 28-02-02-03-0-002-045		Total Contract Amount $2,364,000.00	Amount Sublet to Others	Uncompleted Amount $981,797.09	
16	Agency/Owner Glen Cove CSD - 2022/2023 Capital Improvement Program at Landing Elementary School (2312)				Award Date 06/08/23	Completion Date
	Contact Person John Grillo		Telephone No. 631-476-2161	Designer Architect and/or Design Engineer John A. Grillo Architect P.C. (JAG)		
	Contract No. SED#: 28-01-00-01-0-008-018	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $4,602,000.00	Amount Sublet to Others	Uncompleted Amount $843,496.36	
17	Agency/Owner North Babylon UFSD - Phase 5 Interior Renos at N. Babylon High School & Robert Moses Middle School (2314)				Award Date 06/12/23	Completion Date
	Contact Person Philip Handler		Telephone No. 631-475-0349	Designer Architect and/or Design Engineer BBS Architects & Engineers		
	Contract No. SED#: 58-01-03-03-0-002-048 SED#: 58-01-03-03-0-011-030	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $2,866,000.00	Amount Sublet to Others	Uncompleted Amount $103,232.25	

18	Agency/Owner NYS Office of General Services - Sagamore Children's Psychiatric Ctr. Bldg. 80 Induction Units Replacement (2302)				Award Date 06/28/23	Completion Date
	Contact Person Catherine Skaczkowski		Telephone No. 518-474-5528	Designer Architect and/or Design Engineer NYS Office of General Services		
	Contract No. 47045C	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $764,000.00	Amount Sublet to Others	Uncompleted Amount $582,382.04	
19	Agency/Owner Town of Islip - Long Island MacArthur Airport - Main Terminal Building MEP Upgrades Phase II (2224)				Award Date 11/15/22	Completion Date
	Contact Person Steven Siniski		Telephone No. 631-467-3300	Designer Architect and/or Design Engineer C&S Companies		
	Contract No. DAT 2022-007-GC	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $1,192,000.00	Amount Sublet to Others	Uncompleted Amount $471,197.88	
20	Agency/Owner Pt. Washington Water District - 1,4 Dioxane, Nitrate, PFOA & PFOS Treatment at Stonytown Well 10 Station (2222)				Award Date 02/14/23	Completion Date
	Contact Person Andrew Marrandino & Stephen Laun		Telephone No. 516-364-9890	Designer Architect and/or Design Engineer D&B Engineers & Architects		
	Contract No. 2022-05 GC	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $4,557,000.00	Amount Sublet to Others	Uncompleted Amount $2,763,543.82	
21	Agency/Owner Stony Brook Eastern Long Island Hospital - Pharmacy Relocation (2217)				Award Date 08/02/22	Completion Date
	Contact Person John Pluchino		Telephone No. 631-632-6010	Designer Architect and/or Design Engineer H2M Architects + Engineers		
	Contract No. 752943	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $960,000.00	Amount Sublet to Others	Uncompleted Amount $657,419.74	
22	Agency/Owner Gold Coast Public Library - New Library Building (2216)				Award Date 07/22/22	Completion Date
	Contact Person Joseph Mottola		Telephone No. 631-756-8000 ext 1325	Designer Architect and/or Design Engineer H2M Architects + Engineers		
	Contract No. H2M Project No GCLB-2101	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $8,086,000.00	Amount Sublet to Others	Uncompleted Amount $4,344,551.98	
23	Agency/Owner North Shore CSD - 2019 Capital Project Phase 2 Rebid - Contract GC-1 at High School (2207)				Award Date 04/08/22	Completion Date
	Contact Person Rober Firneis		Telephone No. 631-780-7017	Designer Architect and/or Design Engineer MEMASI		
	Contract No. SED#: 28-05-01-06-0-004-03	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $6,278,000.00	Amount Sublet to Others	Uncompleted Amount $327,928.13	

24	Agency/Owner US Army Engineer District, Louisville - Fort Totten Army Reserve Center Restoration (2205)				Award Date 05/06/22	Completion Date
	Contact Person - Prime Ameresco, Inc.		Telephone No. 508-661-2200	Designer Architect and/or Design Engineer US Army Corps of Engineers		
	Contract No. Project ID: 521282000	Prime or Sub Sub	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $10,272,581.18	Amount Sublet to Others	Uncompleted Amount $5,898,403.68	
25	Agency/Owner Jericho Water District - 1,4 Dioxane & PFOA Treatment at Kirby Lane - GC (2204)				Award Date 02/16/22	Completion Date
	Contact Person Jennifer Gienau		Telephone No. 516-364-9890	Designer Architect and/or Design Engineer D&B Engineers & Architects		
	Contract No. C4-21	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $4,600,000.15	Amount Sublet to Others	Uncompleted Amount $117,800.15	
26	Agency/Owner NYC Parks & Recreation - St. Mary's Recreation Center Reconstruction (2202)				Award Date 02/07/22	Completion Date
	Contact Person Lorenzo Calabrese		Telephone No. 718-760-6866	Designer Architect and/or Design Engineer Sage and Coombe Architects		
	Contract No. X045-115M	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $6,362,014.04	Amount Sublet to Others	Uncompleted Amount $3,495,055.98	
27	Agency/Owner NYCDDC - Kings County Criminal Court Public Restroom Reno-Holding Pens ADA Upgrades Rebid (2128)				Award Date 12/13/21	Completion Date
	Contact Person Travis Letbetter - Contract Mgr.		Telephone No. 718-391-1158	Designer Architect and/or Design Engineer NYC DDC		
	Contract No. CO281TOIL	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $9,385,100.00	Amount Sublet to Others	Uncompleted Amount $934,395.24	
28	Agency/Owner NYC DDC - Countee Cullen Library Exterior Rehabilitation Rebid (2126)				Award Date 11/16/21	Completion Date
	Contact Person Travis Letbetter - Contract Mgr.		Telephone No. 718-391-1158	Designer Architect and/or Design Engineer NYC DDC		
	Contract No. LNCAL15CC	Prime or Sub Prime	Joint Venture (JV) Name, if applicable N/A		EIN of JV, if applicable N/A	
			Total Contract Amount $5,840,000.00	Amount Sublet to Others	Uncompleted Amount $1,260,060.55	

C. Pending contracts not yet started by the bidder

List all contracts awarded to or won by the bidder but not yet started.

Project & Location	Contract Type	Contract Amount ($000)	Date Scheduled to Start	Owner Reference & Tel. No.	Architect/Engineer Reference & Tel. No. (if different from owner)

SAFETY QUESTIONNAIRE

The Bidder must include, with its bid, all information requested on this Safety Questionnaire. Failure to provide a completed and signed Safety Questionnaire at the time of bid opening may result in disqualification of the bid as non-responsive. This Safety Questionnaire will be reviewed as per Section V of the Safety Requirements for Construction Contracts, found in Volume 2 of the Contract.

1. Bidder Information:

Company Name: Stalco Construction, Inc.

DDC Project Number: LQQ122-RG

Company Size: ☐ Ten (10) employees or less

☒ Greater than ten (10) employees

Company has previously worked for DDC: ☒ YES ☐ NO

2. Type(s) of Construction Work:

Identify the types of work that the Bidder has performed in the last three years, and the types of work that are part of this Contract.

TYPE OF WORK	LAST 3 YEARS	THIS PROJECT
General Building Construction	☒	☒
Residential Building Construction	☒	☐
Nonresidential Building Construction	☒	☒
Heavy Construction, except building	☒	☐
Highway and Street Construction	☐	☐
Heavy Construction, except highways	☒	☐
Plumbing, Heating, HVAC	☒	☒
Painting and Paper Hanging	☒	☒
Electrical Work	☒	☒
Masonry, Stonework and Plastering	☒	☒
Carpentry and Floor Work	☒	☒
Roofing, Siding, and Sheet Metal	☒	☐
Concrete Work	☒	☒
Specialty Trade Contracting	☒	☒
Asbestos Abatement		
Other (specify) N/A	☐	☐

3. Experience Modification Rate:

The Experience Modification Rate (EMR) is a rating generated by the National Council of Compensation Insurance (NCCI). This rating is used to determine the contractor's premium for worker's compensation insurance. The Bidder / Contractor may obtain its EMR by contacting its insurance broker or the NCCI. If the Bidder cannot obtain its EMR, it must submit a written explanation as to why.

The Bidder must indicate its Intrastate and Interstate EMR for the past three years. [Note: For contractors with less than three years of experience, the EMR will be considered to be 1.00].

YEAR	INTRASTATE RATE	INTERSTATE RATE
2022	N/A	.90
2023	N/A	1.34
2024	N/A	1.38

If the Intrastate and/or Interstate EMR for any of the past three years is greater than 1.00, the Bidder / Contractor must attach, to this questionnaire, a written explanation for the rating and identify what corrective action was taken to correct the situation resulting in that rating.

4. OSHA Information:

☐ **YES** ☒ **NO** **Contractor has received a willful violation issued by OSHA or a New York City Department of Buildings (NYCDOB) construction-related violation within the last three years.**

☐ **YES** ☒ **NO** **Contractor has had an incident requiring OSHA notification within 8 hours (all work-related fatalities) or an incident requiring OSHA notification within 24 hours (work-related in-patient hospitalization, amputation and all loss of an eye).**

The OSHA Form 300 "Log of Work-Related Injuries and Illnesses" and OSHA Form 300A "Summary of Work-Related Injuries and Illnesses" must be submitted for the last three years for Contractors with more than ten employees.

The Bidder / Contractor must indicate the total number of hours worked by its employees, as reflected in payroll records for the past three (3) years.

The Bidder / Contractor must submit the Incident Rate for Lost Time Injuries (the Incident Rate) for the past three (3) years. The Incident Rate is calculated in accordance with the formula set forth below. For each given year, the total number of incidents is the total number of non-fatal injuries and illnesses reported on the OSHA Form 300 and OSHA Form 300A. The 200,000 hours represents the equivalent of 100 employees working forty hours a week, fifty (50) weeks per year.

$$\text{Incident Rate} = \frac{\text{Total Number of Incidents X 200,000}}{\text{Total Number of Hours Worked by Employees}}$$

YEAR	TOTAL NUMBERS OF HOURS WORKED BY EMPLOYEES	INCIDENT RATE
2022	70,720	0
2023	112,320	0
2024	87,765	4.56

If the Bidder's / Contractor's Incident Rate for any of the past three years is one point higher than the Incident Rate for the type of construction it performs (listed below), the Bidder / Contractor must attach, to this questionnaire, a written explanation for the relatively high rate.

General Building Construction	8.5
Residential Building Construction	7.0
Nonresidential Building Construction	10.2
Heavy Construction, except building	8.7
Highway and Street Construction	9.7
Heavy Construction, except highways	8.3
Plumbing, Heating, HVAC	11.3
Painting and Paper Hanging	6.9
Electrical Work	9.5
Masonry, Stonework and Plastering	10.5
Carpentry and Floor Work	12.2
Roofing, Siding, and Sheet Metal	10.3
Concrete Work	8.6
Specialty Trade Contracting	8.6

5. Safety Performance on Previous DDC Project(s)

☐ YES ☒ NO Fatality or an incident requiring OSHA notification within 24 hours (work-related in-patient hospitalization, amputation and all loss of an eye) on DDC Project(s) within the last three (3) years.

DDC Project Number(s): _____, _____, _____

The Bidder hereby affirms that all the information provided in this Safety Questionnaire and all additional pages and/or attachments, if applicable, consist of accurate representations.

Date: 01/14/25 By: _____

(Signature of Bidder: Owner, Partner, Corporate Officer)

Title: Alan Nahmias - President

Department of Design and Construction

PROJECT ID: **LQQ122-RG**

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

30-30 THOMSON AVENUE
LONG ISLAND CITY, NEW YORK 11101-3045
TELEPHONE (718) 391-1000
WEBSITE www.nyc.gov/ddc

VOLUME 2 OF 3

PROJECT LABOR AGREEMENT
INFORMATION FOR BIDDERS
CONTRACT
PERFORMANCE AND PAYMENT BONDS
SCHEDULE OF PREVAILING WAGES
GENERAL CONDITIONS

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR THE PROJECT

Rego Park Library: New Facility

LOCATION: **91-41 63rd Drive**
BOROUGH: **Queens, NY 11374**
CITY OF NEW YORK

CONTRACT NO. 1 **GENERAL CONSTRUCTION WORK**

Queens Borough Public Library

Weiss Manfredi Architects

Date: **August 19, 2024**

NEW CONSTRUCTION PLA ADDENDUM

In accordance with Article 3, Section 1 of the 2020-2024 NYC Agency New Construction PLA ("New Construction PLA"), the Department of Design and Construction ("DDC") and the Building and Construction Trades Council of Greater New York and Vicinity, on behalf of itself and its affiliated Local Unions, agree to this addendum to include the below new construction contract (the "Project") as Program Work:

- Construction of a new Queens Public Library, located at 91-41 63rd Drive, Rego Park, New York 11374, known as contract number **LQQ-122-RG**.

Pursuant to Article 3, Section 1 of the New Construction PLA, a feasibility study was conducted for the Project by an independent consultant that determined that including the Project as Program Work in the New Construction PLA will result in significant cost savings for DDC and the City of New York ("City"). Based on the foregoing, the City has determined that it is in its best interest to agree to this addendum.

IN WITNESS WHEREOF the parties have caused this addendum to the New Construction PLA to be executed and effective as of the 3rd day of March, 2023.

For Building and Construction Trades Council of Greater New York and Vicinity

BY: Gary LaBarbera

Gary LaBarbera, President

For New York City Department of Design and Construction

BY: _____

Commissioner Thomas Foley

Approved as to form:

Isabel Galis-Menendez

Acting Corporation Counsel
New York City

Date: 2/27/2023 KF

NEW CONSTRUCTION PLA ADDENDUM

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For Building and Construction Trades Council of Greater New York and Vicinity

BY: Gary LaBarbera
Gary LaBarbera, President

For New York City Department of Design and Construction

BY: _____
Commissioner Thomas Foley

Approved as to form:

Isabel Galis-Menendez
Acting Corporation Counsel
New York City

Date: 2/27/2023 KF

NOTICE TO BIDDERS

This contract is subject to a new 2020 Project Labor Agreement

This contract is subject to the attached Project Labor Agreement ("PLA") entered into between the City and the Building and Construction Trades Council of Greater New York ("BCTC") affiliated Local Unions. By submitting a bid, the Contractor agrees that if awarded the Contract the PLA is binding on the Contractor and all subcontractors of all tiers.

The bidder to be awarded the contract will be required to execute a Letter of Assent prior to award. The Contractor shall include in any subcontract a requirement that the subcontractor, and sub-subcontractors of all tiers, become signatory to and bound to the PLA with respect to the subcontracted work. The Contractor will also be required to have all subcontractors of all tiers execute a Letter of Assent prior to such subcontractors performing any Program Work.

Bidders are advised that the City of New York and City agencies have entered into multiple PLAs. The terms of each PLA, while similar, are not identical. Please also note that there are revisions between the 2020 New Construction PLA attached to this bid and the prior 2015 New Construction PLA.

All bidders are urged to review the entire 2020 New Construction PLA prior to submitting a bid.

To the extent that the terms of the PLA conflict with any other terms of the invitation for bids, including the Standard Construction Contract, the terms of the PLA shall govern. Where, however, the invitation for bids, including the Standard Construction Contract, requires the approval of the City/Department, the PLA does not supersede or eliminate that requirement.

This Contract is subject to the apprenticeship requirements of Labor Law § 222 and to apprenticeship requirements established by the Department pursuant to Labor Law § 816-b. Please be advised that the involved trades have apprenticeship programs that meet the statutory requirements of Labor Law § 222(e) and the requirements set by the Department pursuant to Labor Law § 816-b, Contractors and subcontractors who agree to perform the Work pursuant to the PLA are participating in such apprenticeship programs within the meaning of Labor Law § 222(e) and the Department's directive.

If this Contract is subject to the Minority-Owned and Women-Owned Business Enterprise ("M/WBE") program implemented pursuant to New York City Administrative Code § 6-129, the specific requirements of M/WBE participation for this Contract are set forth elsewhere in this bid package. If such requirements are included with this Contract, the City strongly advises Contractors to read those provisions, as well as PLA Article 4, Section 4. A list of certified M/WBE firms may be obtained from the Department of Small Business Services ("DSBS") website at http://mtprawvwsbswtp1-1.nyc.gov/, by emailing MWBE@sbs.nyc.gov, or by calling the DSBS certification hotline at (212) 513-6311, or by visiting or writing the DSBS at One Liberty Plaza, 11th Floor, New York, New York, 10006.

The local collective bargaining agreements ("CBAs") that are incorporated into the PLA as PLA Schedule A Agreements are available from the Department's Agency Chief Contract Officer upon the request of any prospective bidder.

Please note that the "PLA Schedule A" is distinct from the Department's Schedule A that is a part of this invitation for bids.

2020 New Construction Project Labor Agreement
Frequently Asked Questions

1. **Q.** Does a Contractor need to be signatory with the unions in the NYC Building and Construction Trades Council ("BCTC") in order to bid on projects under the PLA?

   A. No, any contractor may bid by signing and agreeing to the terms of the PLA. The contractor need not be signatory with these unions by any other labor agreement or for any other project.

2. **Q.** Does a Contractor agreeing to the PLA and signing the Letter of Assent create a labor agreement with these unions outside of the project covered by the PLA?

   A. No, the PLA applies only to those projects that the Contractor agrees to perform under the PLA and makes no labor agreement beyond those projects. Contractors do not need to sign any additional agreements (*e.g.*, a collective bargaining agreement) with a union aside from the Letter of Assent to work on a PLA project.

3. **Q.** Do the provisions of the PLA apply equally to subcontractors as well as contractors and how does the PLA affect the subcontractors that a bidder may utilize on the project?

   A. Yes, the PLA applies to subcontractors and all subcontractors performing Program Work must agree to become party to the PLA. Subject to the Agency's approval of subcontractors pursuant to Article 17 of the Standard Construction Contract, a Contractor may use any subcontractor, union or non-union, as long as the subcontractor signs the Letter of Assent. See PLA Article 2, Section 8.

4. **Q.** Are bidders required to submit Letters of Assent signed by proposed subcontractors with their bid in order to be found responsive?

   A. No, bidders do not have to submit signed Letters of Assent from their subcontractors with their bid. However, subcontractors performing Program Work will be required to sign the Letter of Assent prior to being approved by the Agency.

5. **Q.** May a Contractor or subcontractor use any of its existing employees to perform this work?

   A. Generally, labor will be referred to the Contractor from the respective signatory local unions. However, Contractors and subcontractors may use up to 12% of their existing, qualifying labor force for this work. Certified M/WBEs for which participation goals are set pursuant to NYC Administrative Code § 6-129 that are not signatory to any Schedule A collective bargaining agreements ("CBAs") may use their existing employees for the 2nd, 4th, 6th and 8th employee (per trade) needed on the job if their contracts are valued at or under $2,000,000. Any additional workers will be referred to the Contractor in accordance with the 12% referral requirements set forth in the PLA. See PLA Article 4, Section 2.

6. **Q.** Must the City set M/WBE participation goals for the particular project or contract in order for a certified M/WBE to utilize the provisions of PLA Article 4, Section 2(C)?

   A. No. PLA Article 4, Section 2(C) specifies what categories of M/WBEs are eligible to take advantage of this provision (i.e., those M/WBEs for which the City is authorized to set participation goals under § 6-129). For purposes of Article 4, Section 2(C), it is not necessary for the project to be subject to § 6-129 or for the City to have actually set participation goals for the particular contract or project. The result is the same where a project receives State funding and therefore is subject to the requirements of Article 15-A of the Executive Law.

7. **Q.** May a Contractor bring in union members from locals that are not signatory unions?

   A. Referrals will be from the respective signatory locals and/or locals listed in Schedule A of the PLA. Contractors may utilize 'traveler provisions' contained in the local CBAs where such provisions exist and/or in accordance with the provisions of PLA Article 4, Section 2.

8. **Q.** Does a non-union employee working under the PLA automatically become a union member?

   A. No, the non-union employee does not automatically become a union member by working on a project covered by the PLA and nothing in the PLA requires employees to join a union or pay dues or fees to a union as a condition of working on the covered project. This Agreement is not, however, intended to supersede independent requirements in applicable local union agreements as to contractors that are otherwise signatory to those agreements and as to employees of such employers performing covered work. Non-union employees will be enrolled in the appropriate benefit plans and earn credit toward various union benefit programs except in certain circumstances as set forth in the PLA. See PLA Article 4, Section 6 and Article 11.

9. **Q.** Are all Contractors and subcontractors working under the PLA, including non-union Contractors and Contractors signatory to CBAs with locals other than those that are signatories to the PLA, required to make contributions to designated employee benefit funds?

   A. Except in certain circumstances, as described in the following paragraph, Contractors and subcontractors working under the PLA will be required to contribute on behalf of all employees covered by the PLA to established jointly trusteed employee benefit funds designated in the Schedule A CBAs and required to be paid on public works under any applicable prevailing wage law. The Agency may withhold from amounts due the Contractor any amounts required to be paid, but not actually paid into any such fund by the Contractor or a subcontractor. See PLA Article 11, Section 2.

   Non-union Contractors with bona fide private benefit plans that satisfy the requirements of Labor Law 220 will not be required to pay into union benefit funds for their employees working pursuant to Article 4, Section 2 (B) and (C) ("Core Employees") who are already covered under their bona fide private benefit plans. Supplemental

benefit funds in excess of the annualized value of the private benefit plans will be paid directly to workers as additional wages in compliance with Labor Law § 220. At the time of contract award, the Contractor shall make available to the contracting Agency a complete set of plan documents for each private benefit plan into which contributions will be made and/or coverage provided. The Contractor shall also provide certification from a certified public accountant as to the annualized hourly value of such benefits consistent with the requirements of Labor Law § 220. See PLA Article 11, Section 2.

10. **Q.** When do Core Employees become eligible for union benefits?

    A. Union benefit plans have their own plan documents that determine eligibility and workers will become eligible for certain benefits at different points in time. Contractors who will have Core Employees should speak with the respective union(s) as to benefit eligibility thresholds. Employees that may remain unaffiliated with any local union at the completion of their employment may apply for any distributions to which they may be entitled from the funds in accordance with the applicable rules and governing documents of the unions and the employee benefit funds.

11. **Q.** What happens if a Contractor or subcontractor fails to make a required payment to a designated employee benefit fund?

    A. The PLA sets forth a process for unions to address a Contractor or a subcontractor's failure to make required payments. The process includes potentially the direct payment by the City to the benefit fund of monies owed and the corresponding withholding of payments to the Contractor. See PLA Article 11, Section 2.

    Upon notification by a union or fringe benefit fund that a Contractor is delinquent in its payment of benefits and a determination by the Agency that the union or fund has submitted appropriate documentation of such delinquency, the Agency will thereafter require the Contractor to submit cancelled checks or other equivalent proof of payment of benefit contributions with certified payroll reports for work covered by this PLA on which the Contractor is engaged.

    The City strongly advises Contractors to read these provisions carefully and to include appropriate provisions in subcontracts addressing these possibilities.

12. **Q.** Does signing on to the PLA satisfy the Apprenticeship Requirements established for this bid?
    A. Yes. By agreeing to perform the Work subject to the PLA, the bidder demonstrates compliance with the apprenticeship requirements imposed by this Invitation for Bids.

13. **Q.** Who decides on the number of workers needed?

    A. Except as expressly limited by a specific provision of the PLA, a Contractor retains full and exclusive authority for the management of their operations, including the determination as to the number of employees to be hired and the qualifications therefore and the promotion, transfer, and layoff of its employees. See PLA Article 6, Section 1.

14. **Q.** What happens if a union does not provide a worker within 48 hours from the request (Saturdays, Sundays, and holidays excepted)?

A. In the event that a Local Union does not fill any request for qualified employees within a 48-hour period after such requisition is made by a Contractor (Saturdays, Sundays and holidays excepted), a Contractor may employ qualified applicants from any other available source.

15. **Q.** May a Contractor discharge a union referral for lack of productivity?

A. Except as expressly limited by a specific provision of the PLA, a Contractor retains full and exclusive authority for the management of their operations, including the right to discipline or discharge for just cause its employees. See PLA Article 6, Section 1.

16. **Q.** May a contractor assign a management person to site?

A. Yes. Managers are not subject to the provisions of the PLA, so there is no restriction on management and/or other non-trade personnel, as long as such personnel do not perform trade functions. See Article 3, Section 1.

17. **Q.** What type of work can Stewards perform?

A. All Stewards must be working Stewards (*i.e.*, they must be performing Program Work). In addition, Stewards may perform other tasks such as receiving complaints or grievances from other employees of the Steward's trade. Stewards may not determine when overtime is worked. Stewards are entitled to the same wages as other employees of that trade. See PLA Article 5, Sections 2 and 3.

18. **Q.** Can a Contractor utilize apprentices?

A. Contractors are permitted to utilize apprentices so long as the ratios between journeyperson and apprentice do not exceed the allowable ratios set by the New York State Department of Labor ("NYSDOL"). Should a Contractor request that apprentices be provided for Program Work, the referring Local Union shall comply with that request so long as it is consistent with the maximum ratios permitted by NYSDOL.

19. **Q.** What is HireNYC Construction Careers?

A. HireNYC Construction Careers is an initiative to advance career opportunities within the construction industry. The initiative has a target goal of 30% of all hours worked on PLA projects are performed by workers who reside in NYCHA housing or zip codes where 15% or more of the residences are below poverty. When a Contractor requests employees, the trades will take into account the target goals when they refer additional workers.

20. **Q.** Does the PLA provide a standard work day across all the signatory trades?

A. Yes, all signatory trades will work an eight (8) hour day, Monday through Friday with a day shift at straight time as the standard work week. See PLA Article 12, Section 1.

21. **Q.** Does the PLA create a common holiday schedule for all the signatory trades?

A. Yes, the PLA recognizes nine common holidays. See PLA Article 12, Section 4.

22. **Q.** Are workers entitled to holiday pay if they do not work on the holiday?

A. No. Workers are only entitled to pay if they work on the holiday. See PLA Article 12, Section 4.

23. **Q.** May the Contractor schedule overtime work, including work on a weekend?

A. Yes, the PLA permits the Contractor to schedule overtime work, including work on weekends. See PLA Article 12, Sections 2, 3, and 5. To the extent that the Agency's approval is required before a Contractor may schedule or be paid for overtime, that approval is still required notwithstanding the PLA language.

24. **Q.** Are overtime payments affected by the PLA?

A. Yes, all overtime pay incurred Monday through Saturday will be at time and one half (1 ½). There will be no stacking or pyramiding of overtime pay under any circumstances. See PLA Article 12, Section 2. Sunday and holiday overtime will be paid according to each trade's CBA.

25. **Q.** Does the PLA contain special provisions for the staffing of temporary services?

A. Yes. Where temporary services are required by specific request of the Agency or construction manager, they shall be provided by the Contractor's existing employees during working hours in which a shift is scheduled for employees of the Contractor. The need for temporary services during non-working hours will be determined by the Agency or construction manager. There will be no stacking of trades on temporary services. See PLA Article 15.

26. **Q.** What do the workers get paid when work is terminated early in a day due to inclement weather or otherwise cut short of 8 hours?

A. The PLA provides that employees who report to work pursuant to regular schedule and not given work will be paid two hours of straight time. Work terminated early for severe weather or emergency conditions will be paid only for time actually worked. In other instances where work is terminated early, the worker will be paid for a full day. See PLA Article 12, Sections 6 and 8. The usual reporting pay requirement of two hours for employees who report to their work location pursuant to their regular schedule does not apply when the National Weather Service issues a Weather Advisory

and the Contractor speaks to the employee at least four hours before their shift starting time. See PLA Article 12, Section 6.

27. **Q.** Should a local collective bargaining agreement of a signatory union expire during the project will a work stoppage occur on a project subject to the PLA?

A. No. All the signatory unions are bound by the 'no strike' agreement as to the PLA work. Work will continue under the PLA and the otherwise expired local CBA(s) until the new local CBA(s) are negotiated and in effect. See PLA Articles 7 and 19.

28. **Q.** May a Contractor working under the PLA be subject to a strike or other boycott activity by a signatory union at another site while the Contractor is a signatory to the PLA?

A. Yes. The PLA applies ONLY to work under the PLA and does not regulate labor relations at other sites even if those sites are in close proximity to PLA work.

29. **Q.** If a Contractor has worked under other PLAs in the New York City area, are the provisions in this PLA generally the same as the others?

A. While PLAs often look similar to each other, and particular clauses are often used in multiple agreements, each PLA is a unique document and should be examined accordingly.

30. **Q.** What happens if a dispute occurs between the Contractor and an employee during the project?

A. The PLA contains a grievance and arbitration process to resolve disputes between the Contractor and the employees. See PLA Article 9.

31. **Q.** What happens if there is a dispute between locals as to which local gets to provide employees for a particular project or a particular aspect of a project?

A. The PLA provides for jurisdictional disputes to be resolved in accordance with the NY Plan. A copy of the NY Plan is available upon request from the Agency. The PLA provides that work is not to be disrupted or interrupted pending the resolution of any jurisdictional dispute. The work proceeds as assigned by the Contractor until the dispute is resolved. See PLA Article 10.

32. **Q.** How do the referral rules work for Operating Engineers Locals 14 and 15?

A. If there is Program Work within the jurisdiction of Operating Engineers Locals 14 or 15, the contractor shall request labor from the appropriate local union. If the locals provide labor consistent with the referral provisions outlined in Article 4, Section 2, the terms of the Local 14 CBA or Local 15 CBA will apply to that work. However, if the locals do not provide labor for that work, the terms of the PLA will apply to such work.

District Councils & Affiliates Contact Information

Bricklayers & Allied Craftworkers Local 1
4 Court Square
Long Island City, NY 11101
Business Manager: Jack Argila
P: (718) 392-0525
email: jargila@bac1ny.com

BoilerMakers Local 5
24 Van Siclen Avenue
Floral Park, NY 11001
Business Manager: Steve Ludwigson
P: 516-326-2500
email: boilermakerslocal5@verizon.net

Building Concrete & Excavating Laborers Local 731
34-11 35th Avenue
Astoria, NY 11106
Business Manager: Joseph D'Amato
P: 718-706-0720
email: joed731bm@gmail.com

NYC & Vicinity District Council of Carpenters
395 Hudson Street, 9th Fl
New York, NY 10014
Business Manager: Joe Geiger
P: 212-366-7500
email: jgeiger@nycdistrictcouncil.org

Concrete Workers District Council No. 16
30-56 Whitestone Expressway Suite 320
Flushing, NY 11354
Business Manager: Angelo Angelone
P: 718-886-0516
email: ccwdc16@yahoo.com

Cement Masons Local #780
150-50 14th Rd Suite 4
Whitestone, NY 11357
Business Manager: Gino Castingnoli
P: 718-357-3750
email: gcastignoli@noedc.org

Electrical Local 3
158-11 Harry Van Arsdale Jr. Avenue
Flushing, NY 11365
Business Manager: Chris Erikson
P: 718-591-4000
email: cerikson@local3ibew.org

Roofers & Waterproofers Local 8
12-11 43rd Avenue
LIC, NY 11101
Business Manager: Nick Siciliano
P: 718-361-1169
email: nick@fundsforlocal8roofers.org

SheetMetal Workers Local 28
500 Greenwich Street
New York, NY 10013
Business Manager: Eric Meslin
P: 212-941-7700
email: emeslin@local28union.com

SheetMetal Workers Local 137
21-42 44th Drive
LIC, NY 11101
Business Manager: Dante Dano
P: 718-937-4514
email: dante@local137.com

Elevator Constructors Local 1
47-24 27th Avenue
LIC, NY 11101
Business Manager: Lenny Legotte
P: 718-767-7004
email: llegotte@localoneiuec.com

Engineers Local 14
141-57 Northern Boulevard
Flushing, NY 11354
Business Manager: Edwin Christian
P: 718-939-0600
email: lynnd@iuoelocal14.com

Engineers Local 15, 15A, 15B, 15C & 15D
44-40 11th Street
Long Island City, 11101
Business Manager: Tom Callahan
P: 212-929-5327
email: love015@aol.com

Engineers Local 30
16-16 Whitestone Expressway
Whitestone, NY 11357
Business Manager: William Lynn
P: 718-847-8484
email: williamlynn@iuoelocal30.org

Engineers Local 94
331-337 West 44th Street
New York, NY 10036
Business Manager: Kuba Brown
P: 212-245-7040
email: kubabrown@local94.com

Heat & Frost Insulators Local 12
35-53 24th Street
LIC, NY 11101
Business Manager: John Jovic
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email: john@insulatorslocal12.com

Heat & Frost Insulators Local 12A
1536 127th Street
College Point, NY 11356
Business Manager: Jamie Soto
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Steamfitters Local 638
32-32 48th Avenue
LIC, NY 11101
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Teamsters Local 282
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Teamsters Local 814
21-42 44th Drive
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Business Manager: Jason Ide
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Iron Workers District Council
227 E 56th Street Suite 300A
New York, NY 10022
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email: jmahoney@iwintl.org

Mason Tenders District Council
520 8th Avenue
New York NY 10018
Business Manager: Robert Bonanza
P: 212-452-9400
email: RBonanza@MasonTenders.org

Painters District Council No. 9
45 West 14th Street
New York, NY 10011
Business Manager: Joe Azzopardi
P: 212-255-2950
email: joeazzo1281@yahoo.com

Pavers & Roadbuilders DC No.1
136-25 37th Avenue, Suite 502
Flushing NY 11354
Business Manager: Keith Lozcalzo
P: 718-886-3310
email: klozcalzo@aol.com

Plasterers Local 262
2241 Conner Streeet
Bronx, NY 10466
Business Manager: Dale Alleyne
P:718-547-5440
email: dalleyne@noedc.org

Plumbers Local 1
50-02 5th Street
Long Island City, NY 11101
Business Manager: Michael Apuzzo
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email: mapuzzo@ualocal1.org

Private Sanitation Local 813
45-18 Court Square, Suite 600
LIC, NY 11101
Business Manager: Sean Campbell
P: 718-937-7010 ext 244
email: orodriguez@teamsters813.org

Tile Marble & Terrazzo Local 7
45-34 Court Square
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Business Manager: William Hill
P: 718-786-7648
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Window Cleaners No. 2 SEIU 32BJ
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Business Manager: Gerard McEneaney
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Carpenters District Council

NYC & Vicinity District Council of Carpenters
395 Hudson Street, 9th Fl
New York, NY 10014
Business Manager: Joe Geiger
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Carpenters Local 20
900 South Avenue
Suite 53
Staten Island, NY 10310

Carpenters Local 926
373 96th Street
Brooklyn, NY 11209
P: 718-491-0926

Carpenters Local 45
214-38 Hillside Avenue
Queens Village, NY 11427
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Dockbuilders/Timberman Local 1556
395 Hudson Street 1st Floor
New York, NY 10014

Carpenters Local 157
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Millwright & Machinery Erectors Local 740
89-07 Atlantic Avenue
Woodhaven, NY 11412
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Concrete Workers District Council No. 16

Concrete Workers District Council No. 16
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Flushing, NY 11354
Business Manager: Angelo Angelone
P: 718-886-36432

Cement & Concrete Workers Local 6A
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Business Manager: Anthony Amella Jr
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Cement & Concrete Workers Local 20
36-36 33rd Street
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Business Manager: John Peters
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Cement & Concrete Workers Local 18A
4235 Katonah Avenue
Bronx, NY 10470
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email: local18a@yahoo.com

Iron Workers District Council

Iron Workers District Council
227 E 56th Street Suite 300A
New York, NY 10022
Business Manager: James Mahoney
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IronWorkers Local 361
89-19 97th Avenue
Ozone Park, NY 11416
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email: mchartrand@local361.com

Metal Lathers Local 46
1332 Third Avenue
New York, NY 10021
Business Manager:
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email:

Ironworkers Local 40
451 Park Avenue South
New York, NY 10016
Business Manager: Bob Walsh
P: 212-889-1320
email: bobwalsh@ironworkers.net

Derrickmen & Riggers Local 197
35-53 24th Street
LIC, NY 11106
Business Manager: William Hayes
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Ornamental IronWorkers Local 580
501 West 42nd Street
New York, NY 10036
Business Manager: Pete Myers
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email: pmyers@Local-580.com

Mason Tenders District Council

Mason Tenders District Council
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New York NY 10018
Business Manager: Robert Bonanza
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email: RBonanza@MasonTenders.org

Construction & General Laborers Local 79
520 8th Avenue
New York, NY 10018
Business Manager: Michael Prohaska
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email: mpro@laborerslocal79.org

Asbestos Lead & Hazardous Waste Laborers Local 78
30 Cliff Street
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Business Manager: Pawell Gruchacz
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email: pgruchacz@local78.org

Painters District Council # 9

**Painters District Council No. 9*
45 West 14th Street
New York, NY 10011
Business Manager: Joseph Azzopardi
P: 212-255-2950

Drywall Tapers Local 1974
265 West 14th Street
New York, NY 10011
Business Manager: Sal Marsala
P: 212-242-8500
email:

Painters Structural Steel Local 806
40 West 27th Street
New York, NY 10001
Business Manager: Brian Casey
P: 212-447-1838/0149
email: bcasey6009@gmail.com

Glaziers Local 1087
45 West 14th Street
New York, NY 10011
Business Manager: Steve Birmingham
P: 212-924-5200
email: bermo1087@gmail.com

Metal Polishers Local 8A-28A
36-18 33rd Street 2nd Floor
LIC, NY 11106
Business Manager:
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email:

PROJECT LABOR AGREEMENT
COVERING SPECIFIED
NEW CONSTRUCTION OF IDENTIFIED CITY OWNED BUILDINGS AND STRUCTURES

2020 – 2024

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PROJECT LABOR AGREEMENT COVERING IDENTIFIED NEW CONSTRUCTION OF NEW YORK CITY OWNED BUILDINGS & STRUCTURES

ARTICLE 1 - PREAMBLE

WHEREAS, the City of New York desires to provide for the cost efficient, safe, quality, and timely completion of certain new construction work ("Program Work," as defined in Article 3) in a manner designed to afford the lowest costs to the Agencies covered by this Agreement, and the public it represents, and the advancement of permissible statutory objectives;

WHEREAS, this Project Labor Agreement will foster the achievement of these goals, inter alia, by:

(1) providing a mechanism for responding to the unique construction needs associated with this Program Work and achieving the most cost-effective means of construction, including direct labor cost savings, by the Building and Construction Trades Council of Greater New York and Vicinity and the signatory Local Unions and their members waiving various shift and other hourly premiums and other work and pay practices which would otherwise apply to Program Work;

(2) expediting the construction process and otherwise minimizing the disruption to the covered Agencies' ongoing operations at the facilities that are the subject of the Agreement;

(3) avoiding the costly delays of potential strikes, slowdowns, walkouts, picketing and other disruptions arising from work disputes, reducing jobsite friction on common situs worksites, and promoting labor harmony and peace for the duration of the Program Work;

(4) standardizing the terms and conditions governing the employment of labor on Program Work;

(5) permitting wide flexibility in work scheduling and shift hours and times to allow maximum work to be done during off hours yet at affordable pay rates;

(6) permitting adjustments to work rules and staffing requirements from those which otherwise might obtain;

(7) providing comprehensive and standardized mechanisms for the settlement of work disputes, including those relating to jurisdiction;

(8) fostering increased participation by Minority and Women-owned Business Enterprises ("MWBEs");

(9) encouraging the development of pathways to construction careers;

(10) ensuring a reliable source of skilled and experienced labor; and

(11) securing applicable New York State Labor Law exemptions.

WHEREAS, the Building and Construction Trades Council of Greater New York and Vicinity its participating affiliated Local Unions and their members, desire to assist the City in meeting these operational needs and objectives as well as to provide for stability, security and work opportunities which are afforded by this Project Labor Agreement; and

WHEREAS, the Parties desire to maximize Program Work safety conditions for both workers and the community in the project area.

NOW, THEREFORE, the Parties enter into this Agreement:

SECTION 1. PARTIES TO THE AGREEMENT

This is a Project Labor Agreement ("Agreement") entered into by the City of New York ("City"), acting through the Department of Design and Construction, on behalf of itself and the Agencies covered herein, including in their capacity as construction manager of covered projects and/or on behalf of any third party construction manager which may be utilized, and the Building and Construction Trades Council of Greater New York and Vicinity ("Council" or "BCTC") (on behalf of itself) and the signatory affiliated Local Unions ("Unions" or "Local Unions"). The Council and each signatory Local Union hereby warrant and represents that it has been duly authorized to enter into this Agreement.

ARTICLE 2 - GENERAL CONDITIONS

SECTION 1. DEFINITIONS

A. The term "Agency" means the Department of Design and Construction ("DDC") or such other City agency that executes an addendum pursuant to Article 3, Section 1(A) of this Agreement; with respect to Program Work as defined in Article 3, the New York City Agency that awards a particular contract subject to this Agreement may be referred to hereafter as the "Agency";

B. The term "Agreement" means this project labor agreement ("PLA"), the applicable Schedule "A" Collective Bargaining Agreements (each a "CBA") identified in Schedule "A", and each Exhibit hereto;

C. The term "BCTC" refers to the Building and Construction Trades Council of Greater New York and Vicinity. The terms "BCTC" and "Council" are used interchangeably;

D. The term "Contractor(s)" shall include any Construction Manager, General Contractor and all other contractors, and subcontractors of all tiers engaged in Program Work within the scope of this Agreement as defined in Article 3. When an Agency acts as Construction Manager, unless otherwise provided, it has the rights and obligations of a "Construction Manager" in addition to the rights and obligations of an Agency;

E. The term "Core Employee" means an employee that has been on a contractor's payroll consistent with Article 4, Section 2(B) and (C);

F. The term "Minor Repair" means routine repair, service, or maintenance that is recurrent, day to day, periodic scheduled or routine work required to preserve or restore a building, facility or system to working order;

G. The term "HireNYC Construction Careers" refers to the PLA initiative to advance career opportunities for Program Hires;

H. The term "Program Work" is the work covered by this Agreement as defined in Article 3;

I. The term "Program Hire" means an individual that resides in a zip code where at least 15% of the individuals residing in such zip code are below the federal poverty rate and residents of NYCHA housing regardless of zip codes; and

J. The term "Union(s)" or "Local Union(s)" refers to the various participating unions affiliated with the BCTC, singularly and collectively.

SECTION 2. CONDITIONS FOR AGREEMENT TO BECOME EFFECTIVE

This Agreement shall not become effective unless each of the following conditions are met: the Agreement is executed by (1) the Council, on behalf of itself, (2) the participating affiliated Local Unions; and (3) the Commissioner of DDC or their designee.

SECTION 3. ENTITIES BOUND & ADMINISTRATION OF AGREEMENT

This Agreement shall be binding on all participating Unions and their affiliates, the Construction Manager (in its capacity as such) and all Contractors of all tiers performing Program Work, as defined in Article 3. The Contractors shall include in any subcontract that they let for performance during the term of this Agreement a requirement that their subcontractors, of all tiers, become signatory and bound by this Agreement with respect to that subcontracted work falling within the scope of Article 3 and all Contractors (including subcontractors) performing Program Work shall be required to sign a "Letter of Assent" in the form annexed hereto as Exhibit "A". This Agreement shall be administered by the applicable Agency or a Construction Manager or such other designee as may be named by the Agency or Construction Manager, on behalf of all Contractors.

SECTION 4. SUPREMACY CLAUSE

This Agreement, together with the local Collective Bargaining Agreements (each a "CBA") appended hereto as Schedule "A", represents the complete understanding of all signatories and supersedes any national agreement, local agreement or other CBA of any type which would otherwise apply to this Program Work, in whole or in part, except for Program Work which falls within the jurisdiction of the Operating Engineers Locals 14 and 15. If Program Work falling within the jurisdiction of Operating Engineers Locals 14 and 15 is accepted by and performed by said

locals, only then will such work be performed under the terms and conditions set out in the Schedule "A" agreements of Operating Engineers Locals 14 and 15. The CBAs of the affiliated local unions that cover the particular type of construction work to be performed by the contractor, and as set forth in the Schedule "A" list of agreements, shall be deemed the Schedule "A" Collective Bargaining Agreements ("Schedule "A" CBA") under this Agreement. Where association and independent CBAs for a particular type of construction work are both set forth in Schedule "A", association members shall treat the applicable association agreement as the Schedule "A" CBA and independent contractors shall treat the applicable independent agreement as the Schedule "A" CBA. Subject to the foregoing, where a subject covered by the provisions of this project labor agreement is also covered by a Schedule "A" CBA, the provisions of this project labor agreement shall prevail. It is further understood that no Contractor shall be required to sign any other agreement as a condition of performing Program Work. No practice, understanding or agreement between a Contractor and a Local Union which is not set forth in this Agreement shall be binding with respect to Program Work unless endorsed in writing by the Construction Manager or such other designee as may be designated by the Agency. Nothing in this Agreement requires employees to join a union or pay dues or fees to a union as a condition of working on the covered project. This Agreement is not, however, intended to supersede independent requirements in applicable local union agreements as to contractors that are otherwise signatory to those agreements and as to employees of such employers performing covered work.

SECTION 5. LIABILITY

The liability of any Contractor and the liability of any Union under this Agreement shall be several and not joint. The Construction Manager and any Contractor shall not be liable for any violations of this Agreement by any other Contractor; and the Council and Local Unions shall not be liable for any violations of this Agreement by any other Union.

SECTION 6. THE AGENCY

The Agency (or Construction Manager where applicable) shall require in its bid specifications for all Program Work within the scope of Article 3 that all successful bidders, and their subcontractors of all tiers, become bound by, and signatory to, this Agreement. The Agency (or Construction Manager) shall not be liable for any violation of this Agreement by any Contractor. It is understood that nothing in this Agreement shall be construed as limiting the sole discretion of the Agency or Construction Manager in determining which Contractors shall be awarded contracts for Program Work. It is further understood that the Agency or Construction Manager has sole discretion at any time to terminate, delay or suspend the Program Work, in whole or part, on any project.

SECTION 7. AVAILABILITY AND APPLICABILITY TO ALL SUCCESSFUL BIDDERS

The Unions agree that this Agreement will be made available to, and will fully apply to, any successful bidder for (or subcontractor of) Program Work who becomes signatory thereto, without regard to whether that successful bidder (or subcontractor) performs work at other sites on either a union or non-union basis and without regard to whether employees of such successful bidder (or subcontractor) are, or are not, members of any unions. This Agreement shall not apply to the work of any Contractor which is performed at any location other than the site of Program Work.

SECTION 8. SUBCONTRACTING

Contractors will subcontract Program Work only to a person, firm or corporation who is or agrees to become party to this Agreement.

ARTICLE 3 - SCOPE OF THE AGREEMENT

SECTION 1. WORK COVERED

A. Program Work shall be limited to new construction contracts bid and let by the Agency (or its Construction Manager where applicable) after the effective date of this Agreement,

and advertised for public solicitation prior to December 31, 2024, for new construction on any Project which an addendum has been issued pursuant to the provisions set forth below. Additional Projects may be added to this Agreement through a Project-specific addendum approved by an agency of the City of New York and by the BCTC on behalf of itself and its affiliated Local Unions. Each Project-specific addendum is to outline a description of the project being undertaken, the project's location, and the general findings of the feasibility analysis used as the basis of the determination to utilize a PLA on the project.

B. It is understood that, except where the City specifically applies this Agreement to such work in its bid documents, Program Work does not include, and this Agreement shall not apply to, any other work, including:

1. Contracts let and work performed in connection with projects carried over, recycled from, or performed under bids or rebids relating to work that were bid prior to the effective date of this Agreement or after December 31, 2024;

2. Contracts procured on an emergency basis;

3. Contracts with electric utilities, gas utilities, telephone companies, and railroads, except that it is understood and agreed that these entities may only install their work to a demarcation point, *e.g.*, a telephone closet or utility vault, the location of which is determined prior to construction and employees of such entities shall not be used to replace employees performing Program Work pursuant to this Agreement;

4. Contracts for installation of information technology that are not otherwise Program Work;

5. Contracts that predominantly involve Minor Repair work, as defined in Article 2, Section 1(F) above. Such work is to be paid under the applicable prevailing wage law for

service or maintenance work;

6. Up to five percent (5%) of work performed by certified MWBE subcontractors on prime contracts that are valued at $25,000,000 or more and for which participation goals are set forth in the contract and where such MWBE subcontractor is not signatory to any Schedule "A" agreement ("Exempt Work"). Exempt Work shall be no more than $500,000 or 15% (whichever is greater) of the value of the subcontracts for work in any particular union's jurisdiction under any prime contract; and

7. On-site work performed on purchased equipment, which is required by the manufacturer to be performed by its staff or by its selected contractors as a condition of the continued effectiveness of the equipment warranty.

SECTION 2. TIME LIMITATIONS

In addition to falling within the scope of Article 3, Section 1, to be covered by this Agreement, Program Work must be (1) advertised and let for bid after the effective date of this Agreement, and (2) let for bid prior to December 31, 2024, the expiration date of this Agreement. It is understood that this Agreement, together with all of its provisions, shall remain in effect for all such Program Work until completion, even if not completed by the expiration date of the Agreement. If Program Work otherwise falling within the scope of Article 3, Section 1 is not let for bid by the expiration date of this Agreement, this Agreement may be extended to that work by mutual agreement of the parties.

SECTION 3. EXCLUDED EMPLOYEES

The following persons are not subject to the provisions of this Agreement, even though performing Program Work:

A. Superintendents, supervisors (except field surveyors on construction contracts, general and forepersons specifically covered by a craft's Schedule "A" agreement are included),

engineers, professional engineers and/or licensed architects engaged in inspection and testing, quality control/assurance personnel, timekeepers, mail carriers, clerks, office workers, messengers, guards, technicians, non-manual employees, and all professional, engineering, administrative and management persons;

B. Employees of the Agency, New York City, or any other municipal or State agency, authority or entity, or employees of any other public employer, even though working on the project site while covered Program Work is underway;

C. Employees and entities engaged in off-site manufacture, modifications, repair, maintenance, assembly, painting, handling or fabrication of project components, materials, equipment or machinery, or involved in deliveries to and from the Program site, except to the extent they are lawfully included in the bargaining unit of a Schedule "A" agreement;

D. Employees of the Construction Manager (except that in the event the Agency engages a Contractor to serve as Construction Manager, then those employees of the Construction Manager performing manual, on site construction labor will be covered by this Agreement);

E. Employees engaged in on-site equipment warranty work including installation, repair or maintenance unless employees are already working on the site and are certified to perform warranty work;

F. Employees engaged in geophysical testing other than boring for core samples;

G. Employees engaged in laboratory, specialty testing, or inspections, pursuant to a professional services agreement between the Agency, or any of the Agency's other professional consultants, and such laboratory, testing, inspection or surveying firms;

H. Employees engaged in on-site maintenance of installed equipment or systems which maintenance is awarded as part of a contract that includes Program Work, but which maintenance

occurs after installation of such equipment or system and is not directly related to construction services; and

I. Employees who perform work classified as Minor Repairs, and routine service and/or maintenance work.

SECTION 4. NON-APPLICATION TO CERTAIN ENTITIES

This Agreement shall not apply to those parents, affiliates, subsidiaries, or other joint or sole ventures of any Contractor which do not perform Program Work. It is agreed that this Agreement does not have the effect of creating any joint employment, single employer or alter ego status among the Agency (including in its capacity as Construction Manager) or any Contractor. The Agreement shall further not apply to any New York City or other municipal or State agency, authority, or entity other than a listed Agency and nothing contained herein shall be construed to prohibit or restrict the Agency or its employees, or any State, New York City or other municipal or State authority, agency or entity and its employees, from performing on or off-site work related to Program Work.

As the contracts involving Program Work are completed and accepted, the Agreement shall not have further force or effect on such items or areas except where inspections, additions, repairs, modifications, check-out and/or warranty work are assigned in writing (copy to Local Union involved) by the Agency (or Construction Manager) for performance under the terms of this Agreement.

ARTICLE 4 - UNION RECOGNITION AND EMPLOYMENT

SECTION 1. PRE-HIRE RECOGNITION

The Contractors recognize the signatory Unions as the sole and exclusive bargaining representatives of all employees who are performing on-site Program Work, with respect to that work.

SECTION 2. UNION REFERRAL

A. The Contractors agree to request, employ and hire craft employees, including Program Hires as defined in Article 2, Section 1(I), for Program Work covered by this Agreement through the job referral systems and hiring halls established in the Local Unions' area CBAs set forth in Schedule "A". Notwithstanding this, Contractors shall have sole right to determine the competency of all referrals; to determine the number of employees required; to select employees for layoff (subject to Article 5, Section 3); and the sole right to reject any applicant referred by a Local Union, subject to the show-up payments. In the event that a Local Union does not fill any request for qualified employees within a 48-hour period after such requisition is made by a Contractor (Saturdays, Sundays and holidays excepted), a Contractor may employ qualified applicants from any other available source. In the event that the Local Union does not have a job referral system, the Contractor shall give the Local Union first preference to refer applicants, subject to the other provisions of this Article. The Contractor shall notify the Local Union of craft employees hired for Program Work within its jurisdiction from any source other than referral by the Union. Any employee hired by a Contractor because a Local Union does not fill a request for qualified employees within a 48 hour period (Saturdays, Sundays and holidays excepted) are not covered by this Agreement for purposes of Article 11, Section 2, unless they are or become a member or agency shop fee payor of an affiliated Union.

B. A Contractor may request by name, and the Local will honor, referral of persons who have applied to the Local for Program Work ("Core Employees") and who meet the following qualifications:

(1) possess any license required by New York State law for the Program Work to be performed;

(2) have worked a total of at least 1000 hours in the Construction field during the prior 3 years; and

(3) were on the Contractor's active payroll for at least 60 out of the 180 calendar days prior to the contract award.

No more than twelve per centum (12%) of the employees covered by this Agreement, per Contractor by craft, shall be hired through the special provisions above. Under this provision, name referrals begin with the eighth employee needed and continue on that same basis.

C. Notwithstanding Section 2(B), above, certified MWBE contractors for which participation goals are set forth in New York City Administrative Code §6-129, that are not signatory to any Schedule "A" CBAs, with subcontracts valued at or under two-million dollars ($2,000,000), may request by name, and the Local will honor, referral of the second (2nd), fourth (4th), sixth (6th), and eighth (8th) Core Employee, who have applied to the Local for Program Work and who meet the following qualifications:

(1) possess any license required by New York State law for the Program Work to be performed;

(2) have worked a total of at least 1000 hours in the Construction field during the prior 3 years; and

(3) were on the Contractor's active payroll for at least 60 out of the 365 calendar days prior to the contract award.

D. Where a certified MWBE Contractor voluntarily enters into a CBA with a BCTC Union, the employees of such Contractor at the time the CBA is executed shall be allowed to join the Union for the applicable trade subject to satisfying the Union's basic standards of proficiency for admission.

SECTION 3. NON-DISCRIMINATION IN REFERRALS

The Council represents that each Local Union hiring hall and referral system will be operated in a non-discriminatory manner and in full compliance with all applicable federal, state and local laws and regulations which require equal employment opportunities. Referrals shall not be affected in any way by the rules, regulations, bylaws, constitutional provisions or any other aspects or obligations of union membership, policies or requirements and shall be subject to such

other conditions as are established in this Article. No employment applicant shall be discriminated against by any referral system or hiring hall because of the applicant's union membership, or lack thereof.

SECTION 4. MINORITY, FEMALE, LOCAL AND SECTION 3 REFERRALS

In the event a Local Union either fails, or is unable to refer qualified minority or female applicants in percentages equaling the workforce participation goals adopted by the City and set forth in the Agency's (or, if applicable, Construction Manager's) bid specifications, within 48 hours of the request for same, the Contractor may employ qualified minority or female applicants from any other available source.

The Local Unions agree to prioritize the referral of Program Hires in accordance with Article 13 and to the extent consistent with the law, rules applicable to the union referral systems and joint apprentice programs. Those unions that do not currently provide for zip code preferences in their referral systems will undertake to implement such preferences consistent with this Agreement and their governing documents. Please see Exhibit "C" for a non-exhaustive list of eligible zip codes. Employees from these zip codes that are already on a contractor's workforce, including Core Employees, and referral of apprentices, in accordance with Article 13, Section 1(A) below, shall count towards the referral goals of this Section.

For any Program Work that may become subject to requirements under Section 3 of the Housing and Urban Development Act of 1968, as amended by the Housing and Community Development Act of 1992, and any rules, including new or revised rules, that may be published thereunder, the Local Unions acknowledge the Section 3 obligations of the Construction Manager or Contractor, as applicable, and agree to the zip code and NYCHA preferences described above to help implement this Article in a manner that would allow the Construction Manager or Contractor to meet its Section 3 obligations to the greatest extent feasible, and to post any required notices in

the manner required by Section 3. The parties also acknowledge that the Construction Manager and Contractor may also fulfill its Section 3 requirements on Program Work by promoting opportunities for excluded employees, as defined by Article 3, Section 3 of this Agreement, on Program Work and, to the extent permitted by Section 3, by promoting opportunities for craft and other employees on non-Program Work.

SECTION 5. CROSS AND QUALIFIED REFERRALS

The Local Unions shall not knowingly refer to a Contractor an employee then employed by another Contractor working under this Agreement. The Local Unions will exert their utmost efforts to recruit sufficient numbers of skilled and qualified crafts employees to fulfill the requirements of the Contractor.

SECTION 6. CRAFT FOREPERSONS AND GENERAL FOREPERSONS

The selection of craft forepersons and/or general forepersons and the number of forepersons required shall be solely the responsibility of the Contractor except where otherwise provided by specific provisions of an applicable Schedule "A" CBA, and provided that all craft forepersons shall be experienced and qualified journeypersons in their trade as determined by the appropriate Local Union. All forepersons shall take orders exclusively from the designated Contractor representatives. Craft forepersons shall be designated as working forepersons at the request of the Contractor, except when an existing local CBA prohibits a foreperson from working when the craft persons, they are leading exceed a specified number.

SECTION 7. ON CALL REPAIR REFERRALS

A. When an Agency awards a contract under this Agreement that requires the Contractor to have employees available on short notice to make time-sensitive repairs with such contract requiring the Contractor to respond within as little as two hours from the time the Contractor is contacted by the Agency ("On Call, Repair Contract"), the Contractor will, within ten

(10) days of being awarded an On Call, Repair Contract subject to this Agreement, notify the appropriate affiliated Union that would perform the work for a contractor that the Contractor has been awarded such a contract and immediately enter into good faith negotiations with such relevant affiliated Union to establish a procedure to receive time sensitive referrals from such affiliated Union(s).

B. In the event the Contractor and the relevant affiliated Union(s) are unable to negotiate a specific, mutually agreeable procedure for on call repair referral procedure within twenty (20) days of commencement of negotiations or prior to commencement of performance of the contract, whichever is earlier, the Contractor and the relevant affiliated Unions will follow the following procedure:

1. Upon notification by a Contractor that it has been awarded an On Call, Repair Contract pursuant to paragraph A above, each relevant affiliate Union shall provide the Contractor with the name and twenty-four (24) hour contact information of an On Call, Repair Contract contact person for urgent on call repair referrals.

2. The relevant affiliated Unions shall prepare a list of individuals eligible and prepared for referral on an immediate basis to respond to the on call repair contractor, which may include the affiliated Unions' service, repair and maintenance division workers where appropriate for repairs that can be made within 24 to 48 hours and paid at the appropriate prevailing wage rates for service and repair or maintenance work. Such list shall be provided to and in the possession of the designated-on call repair contact person for the affiliated Union and available for immediate reference.

3. Individuals on such list must be able to comply with the Contractor's response time pursuant to contract requirements.

4. The Union's On Call, Repair Contract contact person shall respond to a contractor's request for referrals within a reasonable time of the request so that compliance with the contract shall be possible.

C. In the event that the Contractor makes a request for an on call referral that is compliant with this procedure and a Union is not able to respond to the request, that Union will be deemed to have waived the forty-eight (48) hour referral rule contained in Section 2 above and the Contractor may employ qualified applicants from any other available source that can meet contract requirements for that time-sensitive on call repair work only; provided, however, that any work related to the repair work that is not of a time sensitive nature under the contract shall comply with Section 2. If a Union fails to timely refer a worker and the Contractor employs other workers, the Contractor will e-mail the Agency within 72 hours and the Agency will forward that e-mail to the designated Labor Management Committee contacts.

ARTICLE 5 - UNION REPRESENTATION

SECTION 1. LOCAL UNION REPRESENTATIVE

Each Local Union representing on-site employees shall be entitled to designate in writing (copy to Contractor involved and Construction Manager) one representative, and/or the Business Manager, who shall be afforded access to the Program Worksite during such time as bargaining unit work is occurring and subject to otherwise applicable policies pertaining to visitors to the site.

SECTION 2. STEWARDS

A. Each affiliated Union shall have the sole discretion to designate any journey person as a Steward and an alternate Steward. The Union shall notify the Owner and/or Construction Manager as well as the Contractor of the identity of the designated Steward (and alternate) prior to the assumption of such duties. Stewards shall not exercise supervisory functions

and will receive the regular rate of pay for their craft classifications. All Stewards shall be working Stewards.

B. In addition to their work as an employee, the Steward shall have the right to receive complaints or grievances and to discuss and assist in their adjustment with the Contractor's appropriate supervisor. Each Steward shall be concerned with the employees of the Steward's trade and, if applicable, subcontractors of their Contractor, but not with the employees of any other trade Contractor. No Contractor shall discriminate against the Steward in the proper performance of Union duties.

C. The Stewards shall not have the right to determine when overtime shall be worked, or who shall work overtime except pursuant to a Schedule "A" CBA provision providing procedures for the equitable distribution of overtime.

SECTION 3. LAYOFF OF A STEWARD

Contractors agree to notify the appropriate Union 24 hours prior to the layoff of a Steward, except in cases of discipline or discharge for just cause. If a Steward is protected against layoff by a Schedule "A" provision, such provision shall be recognized to the extent the Steward possesses the necessary qualifications to perform the work required, except in cases of discipline or discharge for just cause. In any case in which a Steward is discharged or disciplined for just cause, the Local Union involved shall be notified immediately by the Contractor.

ARTICLE 6 - MANAGEMENT'S RIGHTS

SECTION 1. RESERVATION OF RIGHTS

Except as expressly limited by a specific provision of this Agreement, Contractors retain full and exclusive authority for the management of their operations including, but not limited to, the right to: direct the work force, including determination as to the number of employees to be hired and the qualifications therefore; the promotion, transfer, layoff of its employees; require

compliance with the directives of the Agency including standard restrictions related to security and access to the site that are equally applicable to Agency employees, guests, or vendors; or the discipline or discharge for just cause of its employees; assign and schedule work; promulgate reasonable Program Work rules that are not inconsistent with this Agreement or rules common in the industry and are reasonably related to the nature of work; and, the requirement, timing and number of employees to be utilized for overtime work. No rules, customs, or practices which limit or restrict productivity or efficiency of the individual, as determined by the Contractor, Agency and/or Construction Manager and/or joint working efforts with other employees shall be permitted or observed.

SECTION 2. MATERIALS, METHODS & EQUIPMENT

There shall be no limitation or restriction upon the Contractor's choice of materials, techniques, methods, technology or design, or, regardless of source or location, upon the use and installation of equipment, machinery, package units, pre-cast, pre-fabricated, pre-finished, or pre-assembled materials or products, tools, or other labor-saving devices. Contractors may, without restriction, install or use materials, supplies or equipment regardless of their source; provided, however, that where there is a Schedule "A" that includes a lawful union standards and practices clauses, then such clause as set forth in Schedule "A" agreements will be complied with, unless there is a lawful Agency specification (or specification issued by a Construction Manager which would be lawful if issued by the Agency directly) that would specifically limit or restrict the Contractor's choice of materials, techniques, methods, technology or design, or, regardless of source or location, upon the use and installation of equipment, machinery, package units, pre-cast, pre-fabricated, pre-finished, or pre-assembled materials or products, tools, or other labor-saving devices, and which would prevent compliance with such Schedule "A" clause. The on-site installation or application of such items shall be performed by the craft having jurisdiction over

such work; provided, however, it is recognized that other personnel having special qualifications may participate, in a supervisory capacity, in the installation, check-off or testing of specialized or unusual equipment or facilities as designated by the Contractor. There shall be no restrictions as to work which is performed off-site for Program Work.

ARTICLE 7 - WORK STOPPAGES AND LOCKOUTS

SECTION 1. NO STRIKES-NO LOCK OUT

There shall be no strikes, sympathy strikes, picketing, work stoppages, slowdowns, hand billing, demonstrations or other similar disruptive activity at the Program Work site for any reason by any Union or employee against any Contractor or employer. There shall be no other Union or concerted or employee activity which disrupts or interferes with the operation of the Program Work or the objectives of the Agency at any Program Work site. In addition, failure of any Union or employee to cross any picket line established by any Union, signatory or non-signatory to this Agreement, or the picket or demonstration line of any other organization, at or in proximity to a Program Work site where the failure to cross disrupts or interferes with the operation of Program Work is a violation of this Article. Should any employees breach this provision, the Unions will use their best efforts to try to immediately end that breach and return all employees to work. There shall be no lockout at a Program Work site by any signatory Contractor, Agency or Construction Manager.

SECTION 2. DISCHARGE FOR VIOLATION

A Contractor may discharge any employee violating Section 1, above, and any such employee will not be eligible thereafter for referral under this Agreement for a period of 100 days.

SECTION 3. NOTIFICATION

If a Contractor contends that any Union has violated this Article, it will notify the Local Union involved advising of such fact, with copies of the notification to the Council. The Local

Union shall instruct and order, the Council shall request, and each shall otherwise use their best efforts to cause, the employees (and where necessary the Council shall use its best efforts to cause the Local Union), to immediately cease and desist from any violation of this Article. If the Council complies with these obligations it shall not be liable for the unauthorized acts of a Local Union or its members. Similarly, a Local Union and its members will not be liable for any unauthorized acts of the Council. Failure of a Contractor or the Construction Manager to give any notification set forth in this Article shall not excuse any violation of Section 1 of this Article.

SECTION 4. EXPEDITED ARBITRATION

Any Contractor or Union alleging a violation of Section 1 of this Article may utilize the expedited procedure set forth below (in lieu of, or in addition to, any actions at law or equity that may be brought).

A. A party invoking this procedure shall notify J.J. Pierson or Richard Adelman; who shall alternate (beginning with Arbitrator J.J. Pierson) as Arbitrator under this expedited arbitration procedure. If the Arbitrator next on the list is not available to hear the matter within 24 hours of notice, the next Arbitrator on the list shall be called. Copies of such notification will be simultaneously sent to the alleged violator and Council.

B. The Arbitrator shall thereupon, after notice as to time and place to the Contractor, the Local Union involved, the Council and the Construction Manager, hold a hearing within 48 hours of receipt of the notice invoking the procedure if it is contended that the violation still exists. The hearing will not, however, be scheduled for less than 24 hours after the notice required by Section 3, above.

C. All notices pursuant to this Article may be provided by telephone, telegraph, hand delivery, or fax, confirmed by overnight delivery, to the Arbitrator, Contractor, Construction

Manager and Local Union involved. The hearing may be held on any day including Saturdays or Sundays. The hearing shall be completed in one session, which shall not exceed 8 hours duration (no more than 4 hours being allowed to either side to present their case and conduct their cross examination) unless otherwise agreed. A failure of any Union or Contractor to attend the hearing shall not delay the hearing of evidence by those present or the issuance of an award by the Arbitrator.

D. The sole issue at the hearing shall be whether a violation of Section 1, above, occurred. If a violation is found to have occurred, the Arbitrator shall issue a Cease and Desist Award restraining such violation and serve copies on the Contractor and Union involved. The Arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violation or to award damages (any damages issue is reserved solely for court proceedings, if any). The Award shall be issued in writing within 3 hours after the close of the hearing and may be issued without an Opinion. If any involved party desires an Opinion, one shall be issued within 15 calendar days, but its issuance shall not delay compliance with, or enforcement of, the Award.

E. The Agency and Construction Manager (or such other designee of the Agency) may participate in full in all proceedings under this Article.

F. An Award issued under this procedure may be enforced by any court of competent jurisdiction upon the filing of this Agreement together with the Award. Notice of the filing of such enforcement proceedings shall be given to the Union or Contractor involved, and the Construction Manager.

G. Any rights created by statute or law governing arbitration proceedings which are inconsistent with the procedure set forth in this Article, or which interfere with compliance thereto, are hereby waived by the Contractors and Unions to whom they accrue.

H. The fees and expenses of the Arbitrator shall be equally divided between the involved Contractor and Union.

SECTION 5. ARBITRATION OF DISCHARGES FOR VIOLATION

Procedures contained in Article 9 shall not be applicable to any alleged violation of this Article, with the single exception that an employee discharged for violation of Section 1, above, may have recourse to the procedures of Article 9 to determine only if the employee did, in fact, violate the provisions of Section 1 of this Article; but not for the purpose of modifying the discipline imposed where a violation is found to have occurred.

ARTICLE 8 - LABOR MANAGEMENT COMMITTEE

SECTION 1. SUBJECTS

The Program Labor Management Committee (the "LMC") will meet on a regular basis to: 1) promote harmonious relations among the Contractors and Unions; 2) enhance safety awareness, cost effectiveness and productivity of construction operations; 3) protect the public interests; 4) discuss matters relating to staffing and scheduling with safety and productivity as considerations; and 5) review efforts to meet applicable participation goals for MWBEs and workforce participation goals for Program Hires, minority and female employees.

SECTION 2. COMPOSITION

The LMC shall be jointly chaired by a designee of the Agency and the President of the Council. It may include representatives of the Local Unions and Contractors involved in the issues being discussed. The parties shall mutually designate an MWBE representative to participate in appropriate Committee discussions. The Committee may conduct business through mutually agreed upon sub-committees.

ARTICLE 9 - GRIEVANCE & ARBITRATION PROCEDURE
SECTION 1. PROCEDURE FOR RESOLUTION OF GRIEVANCES

Any question, dispute or claim arising out of, or involving the interpretation or application of this Agreement (other than jurisdictional disputes or alleged violations of Article 7, Section 1) shall be considered a grievance and shall be resolved pursuant to the exclusive procedure of the steps described below, provided, in all cases, that the question, dispute or claim arose during the term of this Agreement. Grievances shall include the City contract number and the Program Work address; such information is posted at the work site if already commenced and is available in the City Record and Notice to Proceed for projects not already commenced.

Local Union grievances as to whether a scope of work is included or excluded from this Agreement shall be submitted to the LMC in the first instance rather than Step 1 below. To be timely, such notice must be given no later than five days prior to the bid opening date advertised in the City Record and bid documents for that contract, or any adjourned date publicly noticed if the grievance is challenging a determination by an Agency that the contract is not subject to this Agreement. Compliance with this limit shall operate as a statute of limitations and shall be a condition precedent to arbitration. For other grievances as to contractor and/or subcontractor scope of work issues, notice of such challenges shall be submitted to the LMC within 7 calendar days after the act, occurrence or event giving rise to the grievance. If the scope of work grievance is not resolved within 21 days of its submission to the LMC, then the grievance may proceed directly to Step 3 below.

Step 1:

(a) When any employee covered by this Agreement feels aggrieved by a claimed violation of this Agreement, the employee shall, through the Local Union business representative or job steward give notice of the claimed violation to the work site representative of the involved

Contractor and the Construction Manager. To be timely, such notice of the grievance must be given within 7 calendar days after the act, occurrence or event giving rise to the grievance. The business representative of the Local Union or the job steward and the work site representative of the involved Contractor shall meet and endeavor to adjust the matter within 7 calendar days after timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving party, may, within 7 calendar days thereafter, pursue Step 2 of the grievance procedure by serving the involved Contractor with written copies of the grievance setting forth a description of the claimed violation, the date on which the grievance occurred, and the provisions of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 are non-precedential except as to the specific Local Union, employee and Contractor directly involved unless the settlement is accepted in writing by the Construction Manager (or designee) as creating a precedent.

(b) Should any signatory to this Agreement have a dispute (excepting jurisdictional disputes or alleged violations of Article 7, Section 1) with any other signatory to this Agreement and, if after conferring, a settlement is not reached within 7 calendar days, the dispute shall be reduced to writing and proceed to Step 2 in the same manner as outlined in subparagraph (a) for the adjustment of employee grievances.

Step 2:

A Step 2 grievance shall be filed with the Agency, the BCTC, the Contractor, and, if the grievance is against a subcontractor, the subcontractor. The Business Manager or designee of the involved Local Union, together with representatives of the involved Contractor and/or a contractor association representative where appropriate, Council, the Construction Manager (or designee), and, if the grievance is against a subcontractor, the subcontractor, shall meet in Step 2 within 7 calendar days of service of the written grievance to arrive at a satisfactory settlement. The BCTC shall schedule the Step 2 meeting.

Step 3:

(a) If the grievance shall have been submitted but not resolved in Step 2, any of the participating Step 2 entities may, within 21 calendar days after the initial Step 2 meeting, submit the grievance in writing (copies to other participants, including the Construction Manager or designee) to the BCTC. In the event the matter is not resolved at Step 2, either J.J. Pierson or Richard Adelman, who shall act, alternately (beginning with Arbitrator J.J. Pierson), as the Arbitrator under this procedure, shall be designated at the Step 2 hearing and the BCTC will notify the arbitrator of his designation. After such notification by the BCTC, the local demanding arbitration shall within a reasonable time request the arbitrator to schedule the matter for an arbitration hearing date. The Labor Arbitration Rules of the American Arbitration Association shall govern the conduct of the arbitration hearing, at which all Step 2 participants shall be parties. The decision of the Arbitrator shall be final and binding on the involved Contractor, Local Union and employees and the fees and expenses of such arbitrations shall be borne equally by the involved Contractor and Local Union.

(b) Failure of the grieving party to adhere to the time limits set forth in this Article shall render the grievance null and void. These time limits may be extended only by written consent of the Construction Manager (or designee), involved Contractor and involved Local Union at the particular step where the extension is agreed upon. The Arbitrator shall have authority to make decisions only on the issues presented to him and shall not have the authority to change, add to, delete or modify any provision of this Agreement.

SECTION 2. LIMITATION AS TO RETROACTIVITY

No arbitration decision or award, with the exception of those related to compliance with requirements to pay prevailing wages and supplements in accordance with federal or State law, may

provide retroactivity of any kind exceeding 60 calendar days prior to the date of service of the written grievance on the Construction Manager and the involved Contractor or Local Union.

SECTION 3. PARTICIPATION BY AGENCY AND/OR CONSTRUCTION MANAGER

The Agency and Construction Manager (or such other designee of the Agency) shall be notified by the involved Contractor of all actions at Steps 2 and 3 and, at its election, may participate in full in all proceedings at these Steps, including Step 3 arbitration.

ARTICLE 10 - JURISDICTIONAL DISPUTES

SECTION 1. NO DISRUPTIONS

There will be no strikes, sympathy strikes, work stoppages, slowdowns, picketing or other disruptive activity of any kind arising out of any jurisdictional dispute. Pending the resolution of the dispute, the work shall continue uninterrupted and as assigned by the Contractor. No jurisdictional dispute shall excuse a violation of Article 7.

SECTION 2. ASSIGNMENT

All Program Work assignments shall be made by the Contractor to unions affiliated with the BCTC consistent with the New York Plan for the Settlement of Jurisdictional Disputes ("New York Plan") and its Greenbook decisions, if any. Where there are no applicable Greenbook decisions, assignments shall be made in accordance with the provisions of the New York Plan and local industry practice.

SECTION 3. NO INTERFERENCE WITH WORK

There shall be no interference or interruption of any kind with the Program Work while any jurisdictional dispute is being resolved. The work shall proceed as assigned by the Contractor until finally resolved under the applicable procedure of this Article. The award shall be confirmed in writing to the involved parties. There shall be no strike, work stoppage or interruption in protest of any such award.

ARTICLE 11 - WAGES AND BENEFITS

SECTION 1. CLASSIFICATION AND BASE HOURLY RATE

All employees covered by this Agreement shall be classified in accordance with the work performed and paid the hourly wage rates applicable for those classifications as required by the applicable prevailing wage laws.

SECTION 2. EMPLOYEE BENEFITS

A. The Contractors agree to pay on a timely basis contributions on behalf of all employees covered by this Agreement to those established jointly trusteed employee benefit funds designated in the applicable CBA in Schedule "A" (in the appropriate Schedule "A" amounts), provided that such benefits are required to be paid on public works under any applicable prevailing wage law. Bona fide jointly trusteed fringe benefit plans established or negotiated through collective bargaining during the life of this Agreement may be added if similarly required under applicable prevailing wage law. Contractors, not otherwise contractually bound to do so, shall not be required to contribute to benefits, trusts or plans of any kind which are not required by the prevailing wage law provided, however, that this provision does not relieve Contractors signatory to local collective bargaining agreement with any affiliated union from complying with the fringe benefit requirements for all funds contained in the CBA. Furthermore, employees that may remain unaffiliated with any local union at the completion of their employment under the terms of this Agreement may apply for any distributions to which they may be entitled from the funds in accordance with the applicable rules and governing documents of the unions and the employee benefit funds that they have participated in under the terms of this Agreement.

B. 1. Notwithstanding Section 2 (A) above, and subject to 2 (B)(2) below, Contractors who designate Core Employees pursuant to Article 4, Section 2 (B) and (C) that are not signatory to a Schedule "A" agreement and who maintain bona fide private benefit plans that

satisfy the requirements of Section 220 of the New York State Labor Law, may satisfy the above benefit obligation with respect to those employees by providing those employees with coverage under their private benefit plans (to the extent consistent with Section 220). The total benefit payments to be made on behalf of each such employee must be equal to the total Section 220 supplement amount and any shortfall must be paid by cash supplement to the employee.

2. A contractor that will satisfy its Section 220 obligations in accordance with subsection 2(B)(1) above shall make available to the Agency at the time of contract award a complete set of plan documents for each non-Schedule "A" benefit plan into which contributions will be made and/or coverage provided pursuant to the provisions of Section 2(B)(l) above. The Contractor shall also provide certification from a certified public accountant as to the annualized hourly value of such benefits consistent with the requirements of Section 220.

3. The City shall verify that the alternate benefit plan(s), together with any cash supplement to the employee, is compliant with Section 220 prior to awarding the Contractor a contract covered by this Agreement. In the event the Contractor's alternate benefit plan(s), together with any cash supplement to the employee, is determined to be compliant with Section 220 and will be utilized by the Contractor on behalf of Article 4, Section 2(B) and (C) Core Employees, the Local Unions have no duty to enforce the Contractor's obligations on the alternate benefit plan(s) as they are not party to the alternate plan(s) or privy to the terms and conditions of the plan obligations. In the event the City determines the alternate benefit plan(s), together with any cash supplement to the employee, is not compliant with Section 220, the Contractor may, upon executing a Letter of Assent, satisfy its obligations for all employees, including Core Employees, by contributing to the Schedule "A" benefit plans in accordance with the terms of the Schedule "A" agreements.

C. The Contractors agree to be bound by the written terms of the legally established jointly trusteed Trust Agreements specifying the detailed basis on which payments are to be paid into, and benefits paid out of, such Trust Funds but only with regard to Program Work done under this Agreement and only for those employees to whom this Agreement requires such benefit payments.

D. 1. To the extent consistent with New York City's Procurement Policy Board Rules with respect to prompt payment, as published at www.nyc.gov/ppb, §4-06(e), and in consideration of the unions' waiver of their rights to withhold labor from a contractor or subcontractor delinquent in the payment of fringe benefits contributions ("Delinquent Contractor"); the Agency agrees that where any such union and/or fringe benefit fund shall notify the Agency, the General Contractor, and the Delinquent Contractor in writing with back-up documentation that the Delinquent Contractor has failed to make fringe benefit contributions to it as provided herein and the Delinquent Contractor shall fail, within ten (10) calendar days after receipt of such notice, to furnish either proof of such payment or notice that the amount claimed by the union and/or fringe benefit fund is in dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor which the union or fringe benefit fund claims to be due it, and shall remit the amount when and so withheld to the fringe benefit fund and deduct such payment from the amounts then otherwise due and payable to the General Contractor, which payment shall, as between the General Contractor and the Agency, be deemed a payment by the Agency to the General Contractor; provided however, that in any month, such withholding shall not exceed the amount contained in the General Contractor's monthly invoice for work performed by the Delinquent Contractor. The union or its employee

benefit funds shall include in its notification of delinquent payment of fringe benefits only such amount it asserts the Delinquent Contractor failed to pay on the specific project against which the claim is made and the union or its employee benefit funds may not include in such notification any amount such Delinquent Contractor may have failed to pay on any other City or non-City project.

2. In addition, where a union or employee benefit fund gives notice to the City that a Contractor is Delinquent as defined in subsection 2(D)(1) above and the City determines that the notice includes appropriate back-up documentation that the Contractor is delinquent, the City will promptly, but not later than twenty (20) days after receipt of the notice, provide a copy of said notice to City Agencies. In the event the City determines there is insufficient back-up documentation, it will notify the appropriate union and/or fringe benefit fund promptly, but not later than twenty (20) days after receipt of the Delinquency Notice, and shall include notice of what additional documentation is requested. Any determination by the City that there is insufficient back-up must be reasonable. This provision is intended to enhance compliance with the prevailing wage law and this Agreement with respect to the payment of fringe benefits and is not intended as a substitute for the resolution of a disputed claim pursuant to any applicable law or agreement.

The City and the relevant Agency(s) will thereafter require the Delinquent Contractor to provide cancelled checks or other equivalent proof of payment of benefit contributions that have come due, to be submitted with certified payroll reports for all Program Work covered by this Agreement on which the Delinquent Contractor is engaged, for at least a one-year period or such earlier period if the Contractor is ultimately determined not to be a Delinquent Contractor. Such proof of payment when required is a condition of payment of the Delinquent Contractor's invoices by any entity, including, but not limited to, the City, the relevant Agency(s), Construction Manager, General Contractor, the prime or higher level subcontractor, as is appropriate under the Delinquent

Contractor's engagement. The union and the funds shall upon request receive copies of the certified payrolls, cancelled checks, or other proof of payment from the City and/or the relevant Agency(s).

E. In the event the General Contractor or Delinquent Contractor shall notify the Agency as above provided that the claim of the union or fringe benefit fund is in dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor that the union and/or fringe benefit fund claims to be due it, pending resolution of the dispute pursuant to the union's Schedule "A" agreement, and the amount shall be paid to the party or parties ultimately determined to be entitled thereto, or held until the Delinquent Contractor and union or employee benefit fund shall otherwise agree as to the disposition thereof; provided however, that such withholding shall not exceed the amount contained in the General Contractor's monthly invoice for work performed by the Delinquent Contractor. In the event the Agency shall be required to withhold amounts from a General Contractor for the benefit of more than one fringe benefit fund, the amounts so withheld in the manner and amount prescribed above shall be applied to or for such fund in the order in which the written notices of nonpayment have been received by the Agency, and if more than one such notice was received on the same day, proportionately based upon the amount of the union and/or fringe benefit fund claims received on such day. Nothing herein contained shall prevent the Agency from commencing an interpleader action to determine entitlement to a disputed payment in accordance with section one thousand six of the civil practice law and rules or any successor provision thereto.

F. Payment to a fringe benefit fund under this provision shall not relieve the General Contractor or Delinquent Contractor from responsibility for the work covered by the payment. Except as otherwise provided, nothing contained herein shall create any obligation on the part of

the Agency to pay any union or fringe benefit fund, nor shall anything provided herein serve to create any relationship in contract or otherwise, implied or expressed, between the union/fund and/or fringe benefit and the Agency.

ARTICLE 12 - HOURS OF WORK, PREMIUM PAYMENTS, SHIFTS AND HOLIDAYS

SECTION 1. WORK WEEK AND WORKDAY

A. The standard work week shall consist of 40 hours of work at straight time rates, Monday through Friday, 8 hours per day, plus ½ hour unpaid lunch period.

B. In accordance with project needs, there shall be flexible start times with advance notice from Contractor to the Union. The Day Shift shall commence between the hours of 6:00 a.m. and 9:00 a.m. and shall end between the hours of 2:30 p.m. and 5:30 p.m., for an 8-hour day. The Evening Shift shall commence between the hours of 3:00 p.m. and 6:00 p.m., unless different times are necessitated by the Agency's phasing plans on specific projects. The Night Shift shall commence between the hours of 11:00 p.m. and 2:00 a.m., unless different times are necessitated by the Agency's phasing plans on specific projects. Subject to the foregoing, starting and quitting times shall occur at the Program Work site designated by the Contractor.

C. Scheduling - Except as provided above, Monday through Friday is the standard work week; 8 hours of work plus ½ hour unpaid lunch.

D. Notice - Contractors shall provide not less than 5 days prior notice to the Local Union involved as to the work week and work hour schedules to be worked or such lesser notice as may be mutually agreed upon.

SECTION 2. OVERTIME

Overtime shall be paid for any work over eight (8) hours in a day and any work over forty (40) hours in a week. Overtime shall be paid at time and one half (1½) Monday through Saturday. All overtime work performed on Sunday and Holidays will be paid pursuant to the applicable

Schedule "A". There shall be no stacking or pyramiding of overtime pay under any circumstances. There will be no restriction upon the Contractor's scheduling of overtime or the nondiscriminatory designation of employees who shall be worked, including the use of employees, other than those who have worked the regular or scheduled work week, at straight time rates. The Contractor shall have the right to schedule work so as to minimize overtime or schedule overtime as to some, but not all, of the crafts and whether or not of a continuous nature.

SECTION 3. SHIFTS

A. Flexible Schedules - Scheduling of shift work, including Saturday and Sunday work, shall be within the discretion of the Contractor in order to meet Program Work schedules and existing Program Work conditions including the minimization of interference with the mission of the Agency. It is not necessary to work a day shift in order to schedule a second or third shift, or a second shift in order to schedule a third shift, or to schedule all of the crafts when only certain crafts or employees are needed. Shifts must have prior approval of the Agency or Construction Manager and must be scheduled with not less than five workdays' notice to the Local Union or such lesser notice as may be mutually agreed upon.

B. Second and/or Third Shifts - The second shift shall start between 3 p.m. and 6 p.m. and the third shift shall start between 10 p.m. and 2 a.m., subject to different times necessitated by the Agency phasing plans on specific projects. There shall be no reduction in shift hour work. All employees within the same classification performing Program Work will be paid at the same wage rate regardless of the shift or work, subject only to the foregoing provisions.

C. Flexible Starting Times - Shift starting times will be adjusted by the Contractor as necessary to fulfill Program Work requirements subject to the notice requirements of paragraph A.

SECTION 4. HOLIDAYS

A. Schedule - There shall be nine (9) recognized holidays on the project:

New Year's Day	
Martin Luther King Day	President's Day
Memorial Day	Veteran's Day
Labor Day	Thanksgiving Day
Independence Day	Christmas Day

All said holidays shall be observed on the calendar date except those holidays which occur on Saturday shall be observed on the previous Friday and those that occur on Sunday shall be observed on the following Monday.

B. Payment - Regular holiday pay, if any, for work performed on such a PLA recognized holiday shall be in accordance with the applicable Schedule "A" for work performed on a holiday, even where the PLA holiday differs from the CBA holidays.

C. Exclusivity - No holidays other than those listed in Section 4(A) above shall be recognized or observed.

SECTION 5. SATURDAY WORK

The Contractor may schedule a Saturday workday and such time shall be scheduled and paid at time and one-half (1½) unless the applicable Schedule "A" permits a straight time rate.

SECTION 6. REPORTING PAY

A. Employees who report to the work location pursuant to their regular schedule and who are not provided with work shall be paid two hours reporting pay at straight time rates. An employee whose work is terminated early by a Contractor due to severe weather, power failure, fire

or natural disaster of for similar circumstances beyond the Contractor's control, shall receive pay only for such time as is actually worked. In other instances, in which an employee's work is terminated early (unless provided otherwise elsewhere in this Agreement), the employee shall be paid for their full shift. Contractors shall not be permitted to call, text or email or voicemail employees in advance of their regularly scheduled shift starting time to avoid reporting pay. Notwithstanding the above, in the event that the National Weather Service issues a weather advisory for the area in which the work location is situated, and the entire project is shut down as a result of the Weather Advisory, the Contractor shall be permitted to speak to employees no less than four (4) hours in advance of their shift starting time, unless the Local Union consents to a shorter notice in writing, to advise them not to report to work due to the National Weather Service advisory, and employees who are so notified shall not receive two (2) hours reporting pay if they report to the work location. The Contractor shall make every effort to notify each employee directly and confirm that notification has been received. Voice, text, and email messages left for employees without confirmation of delivery and receipt by employee do not constitute sufficient notice under this provision.

B. When an employee, who has completed their scheduled shift and left the Program Work site, is "called out" to perform special work of a casual, incidental or irregular nature, the employee shall receive overtime pay at the rate of time and one-half of the employee's straight time rate for hours actually worked.

C. When an employee leaves the job or work location of their own volition or is discharged for cause or is not working as a result of the Contractor's invocation of Section 7 below, they shall be paid only for the actual time worked.

D. Except as specifically set forth in this Article there shall be no premiums, bonuses, hazardous duty, high time or other special premium payments or reduction in shift hours of any kind.

E. There shall be no pay for time not actually worked except as specifically set forth in this Article and except where an applicable Schedule "A" requires a full weeks' pay for forepersons.

SECTION 7. PAYMENT OF WAGES

A. Termination - Employees who are laid off or discharged for cause shall be paid in full for that which is due them at the time of termination. The Contractor shall also provide the employee with a written statement setting forth the date of lay off or discharge.

SECTION 8. EMERGENCY WORK SUSPENSION

A Contractor may, if considered necessary for the protection of life and/or safety of employees or others, suspend all or a portion of Program Work. In such instances, employees will be paid for actual time worked, except that when a Contractor requests that employees remain at the job site available for work, employees will be paid for that time at their hourly rate of pay.

SECTION 9. INJURY/DISABILITY

An employee who, after commencing work, suffers a work-related injury or disability while performing work duties, shall receive no less than 8 hours wages for that day. Further, the employee shall be rehired at such time as able to return to duties provided there is still Program Work available for which the employee is qualified and able to perform.

SECTION 10. TIME KEEPING

A Contractor may utilize systems to check employees in and out. Each employee must check in and out and sign a daily sign-in sheet, or other attendance methodology approved in writing by

the Agency(s). The Contractor will provide adequate facilities for checking in and out in an expeditious manner.

SECTION 11. MEAL PERIOD

A Contractor shall schedule an unpaid period of not more than 1/2-hour duration at the work location between the 3rd and 5th hour of the scheduled shift. A Contractor may, for efficiency of operation, establish a schedule which coordinates the meal periods of two or more crafts, or which provides for staggered lunch periods within a craft or trade. If an employee is required to work through the meal period, the employee shall be compensated in a manner established in the applicable Schedule "A".

SECTION 12. BREAK PERIODS

There will be no rest periods, organized coffee breaks or other non-working time established during working hours. Individual coffee containers will be permitted at the employee's work location.

ARTICLE 13 - APPRENTICES AND WORKFORCE DEVELOPMENT

SECTION 1. APPRENTICE RATIOS AND REFERRALS

A. Recognizing the need to maintain continuing supportive programs designed to develop adequate numbers of competent workers in the construction industry and to provide craft entry opportunities for minorities, women and economically disadvantaged non-minority males, Contractors will employ apprentices in their respective crafts to perform such work as is within their capabilities and which is customarily performed by the craft in which they are indentured. Contractors may utilize apprentices and such other appropriate classifications in the maximum ratio permitted by the New York State Department of Labor ("NYSDOL") or the maximum allowed per trade. Apprentices and such other classifications as are appropriate shall be employed in a manner

consistent with the provisions of the appropriate Schedule "A" agreement. The parties encourage, as an appropriate source of apprentice recruitment consistent with the rules and operations of the affiliated unions' apprentice-programs, the use of the Edward J. Malloy Initiative for Construction Skills, Non-Traditional Employment for Women, New York Helmets to Hardhats, and Pathways to Apprenticeship (P2A). Should a Contractor request that apprentices be provided for Program Work, the referring Local Union shall comply with that request so long as it is consistent with the maximum ratios permitted by NYSDOL.

SECTION 2. WORKFORCE DEVELOPMENT

A. The parties to this Agreement recognize the mutual interest in increasing training and career opportunities for Program Hires. The parties are committed to (i) increasing opportunities for Program Hires in these zip codes in pre-apprenticeship and apprenticeship programs, and (ii) using the work opportunities provided by this Agreement to increase the career opportunities for qualified Program Hires, and (iii) to assure the continued availability of a skilled and qualified, readily available construction workforce for this program and future work. The parties agree to the Workforce Development Program set forth in Exhibit "D".

B. Specifically, the parties have established an initiative entitled HireNYC Construction Careers, which is an initiative to advance career opportunities for Program Hires.

C. The HireNYC Construction Careers initiative will work with the Mayor's Office of Workforce Development ("WKDEV") and its Workforce1 Centers to recruit Program Hires interested in employment in the construction industry.

D. HireNYC Construction Careers intends to capitalize on the work opportunities presented by this Agreement to create a pathway to career opportunities in the construction workforce. To this end the HireNYC Construction Careers initiative includes a workforce goal of at least 30% of all hours worked under this Agreement, including by subcontractors pursuant

to Article 3, Section 1(B)(6), to be worked by workers residing within the specified zip codes or NYCHA housing. In order to encourage recruitment of new workers, HireNYC Construction Careers has established a goal that at least 30% of all of those hours are to be worked by apprentices from those zip codes or NYCHA housing.

E. The Contractors and Unions agree to cooperate and participate in the implementation of HireNYC Construction Careers to assist Program Hires with educational and training opportunities related to access to pre-apprenticeship, apprenticeship, and project work as set forth in this Agreement.

F. Reporting Requirements:

i. The Contractors shall report the residence zip code information on all certified payroll reports.

ii. The Local Unions, their referral systems, the affiliated pre-apprentice programs, and Contractors shall cooperate with any protocol developed for monitoring the HireNYC Construction Careers initiative.

iii. The Local Unions shall provide the WKDEV copies of the following reports when such reports are submitted to NYSDOL: *Apprentice Training Recruitment Notification and Minimum Qualifications (AT 505)*, *Apprentice Training Program Affirmative Action Plan (AT 603), Apprenticeship Agreement (AT 401), or such alternate reporting system as the parties may negotiate during the term of this Agreement*.

G. The City and BCTC agree that no less than annually, the LMC shall review the implementation of HireNYC Construction Careers, as well as Program Hire opportunities afforded as a result of the initiative. The City and BCTC will collaborate to develop monitoring

protocol for the purpose of measuring the success of HireNYC Construction Careers. The City and BCTC may, on mutual consent, modify the goals, procedures and protocols, as necessary to afford continued opportunity to Program Hires.

H. To facilitate the commitments set forth in this Agreement, each Local Union shall designate a HireNYC Construction Careers lead representative to work in partnership with WKDEV to implement these workforce and apprenticeship provisions within the union and across City construction contracts.

ARTICLE 14 - SAFETY PROTECTION OF PERSON AND PROPERTY

SECTION 1. SAFETY REQUIREMENTS

Each Contractor will ensure that applicable OSHA and safety requirements are at all times maintained on the Program Work site and the employees and Unions agree to cooperate fully with these efforts to the extent consistent with their rights and obligations under the law. Employees will cooperate with employer safety policies and will perform their work at all times in a safe manner and protect themselves and the property of the Contractor and Agency from injury or harm, to the extent consistent with their rights and obligations under the law. Failure to do so will be grounds for discipline, including discharge. The Construction Manager and/or Contractor may adopt, and the Unions shall agree to, the Drug and Alcohol Testing Policy attached as Schedule "B".

SECTION 2. CONTRACTOR RULES

Employees covered by this Agreement shall at all times be bound by the reasonable safety, security, and visitor rules as established by the Contractors and the Construction Manager for Program Work. Such rules will be published and posted in conspicuous places throughout the Program Work sites. Any site security and access policies established by the Construction Manager or General Contractor intended for specific application to the construction workforce for Program

Work and that are not established pursuant to an Agency directive shall be implemented only after notice to the BCTC and its affiliates and an opportunity for negotiation and resolution by the Labor Management Committee.

SECTION 3. INSPECTIONS

The Contractors and Construction Manager retain the right to inspect incoming shipments of equipment, apparatus, machinery and construction materials of every kind.

ARTICLE 15 - TEMPORARY SERVICES

SECTION 1.

Temporary services, i.e. all temporary heat, climate control, water, power and light, shall only be required upon the determination of the Agency or Construction Manager, and when used shall be staffed and assigned to the appropriate trade(s) with jurisdiction. Temporary services shall be provided by the appropriate Contractors' existing employees during working hours in which a shift is scheduled for employees of the Contractor. The Agency or Construction Manager may determine the need for temporary services requirements during non-working hours, and when used shall be staffed and assigned to the appropriate trades(s), and which may be limited to one person per applicable trade where practicable. There shall be no stacking of trades on temporary services, provided this does not constitute a waiver of primary trade jurisdiction. In the event a temporary system component is claimed by multiple trades, the matter shall be resolved through the New York Plan for Jurisdictional Disputes.

ARTICLE 16 - NO DISCRIMINATION

SECTION 1. COOPERATIVE EFFORTS

The Contractors and Unions agree that they will not discriminate against any employee or applicant for employment because of creed, race, color, religion, sex, sexual orientation, national

origin, marital status, citizenship status, disability, gender identity, age or any other status provided by law, in any manner prohibited by law or regulation.

SECTION 2. LANGUAGE OF AGREEMENT

Any words signifying any gender shall be interpreted to mean any or all gender identities.

ARTICLE 17 - GENERAL TERMS

SECTION 1. PROJECT RULES

A. The Construction Manager and the Contractors shall establish such reasonable Program Work rules that are not inconsistent with this Agreement or rules common in the industry and are reasonably related to the nature of work. These rules will be explained at the pre-job conference and posted at the Program Work sites and may be amended thereafter as necessary. Notice of amendments will be provided to the appropriate Local Union. Failure of an employee to observe these rules and regulations shall be grounds for discipline, including discharge. The fact that no order was posted prohibiting a certain type of misconduct shall not be a defense to an employee disciplined or discharged for such misconduct when the action taken is for cause.

B. The parties adopt and incorporate the BCTC's Standards of Excellence as annexed hereto as Exhibit "B".

SECTION 2. TOOLS OF THE TRADE

The welding/cutting torch and chain fall are tools of the trade having jurisdiction over the work performed. Employees using these tools shall perform any of the work of the trade. There shall be no restrictions on the emergency use of any tools or equipment by any qualified employee or on the use of any tools or equipment for the performance of work within the employee's jurisdiction.

SECTION 3. SUPERVISION

Employees shall work under the supervision of the craft foreperson or general foreperson.

SECTION 4. TRAVEL ALLOWANCES

There shall be no payments for travel expenses, travel time, subsistence allowance or other such reimbursements or special pay except as expressly set forth in this Agreement.

SECTION 5. FULL WORKDAY

Employees shall be at their work area at the starting time established by the Contractor, provided they are provided access to the work area. The signatories reaffirm their policy of a fair day's work for a fair day's wage.

SECTION 6. COOPERATION AND WAIVER

The Construction Manager, Contractors and the Unions will cooperate in seeking any NYSDOL, or any other government, approvals that may be needed for implementation of any terms of this Agreement. In addition, the Council, on their own behalf and on behalf of its participating affiliated Local Unions and their individual members, intend the provisions of this Agreement to control to the greatest extent permitted by law, notwithstanding contrary provisions of any applicable prevailing wage, or other, law and intend this Agreement to constitute a waiver of any such prevailing wage, or other, law to the greatest extent permissible only for work within the scope of this Agreement, including specifically, but not limited to those provisions relating to shift, night, and similar differentials and premiums. This Agreement does not, however, constitute a waiver or modification of the prevailing wage schedules applicable to work not covered by this Agreement.

ARTICLE 18 - SAVINGS AND SEPARABILITY

SECTION 1. THIS AGREEMENT

In the event that the application of any provision of this Agreement is enjoined, on either an interlocutory or permanent basis, or is otherwise determined to be in violation of law, or if such application may cause the loss of project funding or any New York State Labor Law exemption for all or any part of the Program Work, the provision or provisions involved (and/or its application to

particular Program Work, as necessary) shall be rendered, temporarily or permanently, null and void, but where practicable the remainder of the Agreement shall remain in full force and effect to the extent allowed by law (and to the extent no funding or exemption is lost), unless the part or parts so found to be in violation of law or to cause such loss are wholly inseparable from the remaining portions of the Agreement and/or are material to the purposes of the Agreement. In the event a court of competent jurisdiction finds any portion of the Agreement to trigger the foregoing, the parties will immediately enter into negotiations concerning the substance affected by such decision for the purpose of achieving conformity with the court determination and the intent of the parties hereto for contracts to be let in the future.

SECTION 2. THE BID SPECIFICATIONS

In the event that the Agency's (or Construction Manager's) bid specifications, or other action, requiring that a successful bidder (and subcontractor) become signatory to this Agreement is enjoined, on either an interlocutory or permanent basis, or is otherwise determined to be in violation of law, or may cause the loss of project funding or any New York State Labor Law exemption for all or any part of the Program Work, such requirement (and/or its application to particular Program Work, as necessary) shall be rendered, temporarily or permanently, null and void, but where practicable the Agreement shall remain in full force and effect to the extent allowed by law and to the extent no funding or exemption is lost In such event, the Agreement shall remain in effect for contracts already bid and awarded or in construction only where the Agency and Contractor voluntarily accepts the Agreement. The parties will enter into negotiations as to modifications to the Agreement to reflect the court or other action taken and the intent of the parties for contracts to be let in the future.

SECTION 3. NON-LIABILITY

In the event of an occurrence referenced in Section 1 or Section 2 of this Article, neither the Agency, the Construction Manager, any Contractor, nor any Union shall be liable, directly or indirectly, for any action taken, or not taken, to comply with any court order or injunction, other determination, or in order to maintain funding or a New York State Labor Law exemption for Program Work. Bid specifications will be issued in conformance with court orders then in effect and no retroactive payments or other action will be required if the original court determination is ultimately reversed.

SECTION 4. NON-WAIVER

Nothing in this Article shall be construed as waiving the prohibitions of Article 7 as to signatory Contractors and signatory Unions.

ARTICLE 19 - FUTURE CHANGES IN SCHEDULE "A" AREA CONTRACTS

SECTION 1. CHANGES TO AREA CONTRACTS

A. Schedule "A" to this Agreement shall continue in full force and effect until the Contractor and/or Union parties to the Area CBAs that are the basis for the Schedule "A" notify the Mayor's Office of Contract Services ("MOCS"), Agency and Construction Manager in writing by providing a copy of the updated CBA(s) incorporating the changes agreed to in that Area CBA which are applicable to work covered by this Agreement and their effective dates.

B. It is agreed that any provisions negotiated into Schedule "A" CBAs will not apply to work under this Agreement if such provisions are less favorable to those uniformly required of contractors for construction work normally covered by those agreements; nor shall any provision be recognized or applied on Program Work if it may be construed to apply exclusively, or predominantly, to work covered by this Agreement.

C. Any disagreement between signatories to this Agreement over the incorporation into Schedule "A" of provisions agreed upon in the renegotiation of Area CBAs shall be resolved in accordance with the procedure set forth in Article 9 of this Agreement.

SECTION 2. LABOR DISPUTES DURING AREA CONTRACT NEGOTIATIONS

The Unions agree that there will be no strikes, work stoppages, sympathy actions, picketing, slowdowns or other disruptive activity or other violations of Article 7 affecting the Program Work by any Local Union involved in the renegotiation of Area Local CBAs nor shall there be any lock-out on such Program Work affecting a Local Union during the course of such renegotiations.

ARTICLE 20 - WORKERS' COMPENSATION ADR

SECTION 1.

An Alternative Dispute Resolution ("ADR") program may be negotiated and participation in the ADR program will be optional by trade.

ARTICLE 21 - HELMETS TO HARDHATS

SECTION 1.

The Contractors and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the services of the New York City Helmets to Hardhats Program ("H2H") to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the parties.

SECTION 2.

The Unions and Contractors agree to coordinate with H2H to create and maintain an integrated database of veterans interested in working on this project and of apprenticeship and

employment opportunities for this project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

REMAINDER OF PAGE LEFT BLANK INTENTIONALLY

IN WITNESS WHEREOF the parties have caused this Agreement to be executed and effective as of the ___ day of_____, _____.

FOR BUILDING AND CONSTRUCTION TRADES COUNCIL
OF GREATER NEW YORK AND VICINITY

BY: _____
Gary LaBarbera
President

FOR NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION

BY: _____
Lorraine Grillo
Commissioner

APPROVED AS TO FORM:

_____
ACTING CORPORATION COUNSEL
NEW YORK CITY

LIST OF SIGNATORY UNIONS
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO, Local Lodge No.5
Bricklayers and Allied Craftworkers, Local Union No. 1
Building Concrete & Excavating Laborers, Local Union No. 731
N.Y.C. and Vicinity District Council of Carpenters
Cement Masons, Local Union No. 780
Concrete Workers District Council No. 16
Asbestos, Lead & Hazardous Waste, Laborers Local Union No. 78
Construction & General Building Laborers Local Union No. 79
Derrickmen and Riggers Local Union No. 197
International Brotherhood of Electrical Workers, Local Union No. 3
International Union of Elevator Constructors, Local Union No. 1
Heat & Frost Insulators & Allied Workers, Local Union No. 12
Heat & Frost Insulators & Allied Workers, Local Union No. 12A
Pavers & Road Builders, Laborers Local Union No. 1010
New York State Iron Workers District Council
Structural Iron Workers, Local Union No. 40
Structural Iron Workers, Local Union No. 361
Mason Tenders District Council
Metallic Lathers & Reinforcing Ironworkers, Local No. 46
Ornamental Iron Workers, Local Union No. 580
Glaziers No. 1087, District Council 9
Painters, District Council No. 9
Metal Polishers, Local Union No. 8A-28A; District Council No. 9
Drywall Tapers Local Union No 1974, District Council 9
Bridge & Structural Steel Painters, Local Union No. 806, District Council 9
Operative Plasterers Local Union No. 262
UA Plumbers Local Union No. 1
Private Sanitation, Teamsters Local Union No. 813
Roofers & Waterproofers, Local Union No. 8
Sheet Metal Workers, Local Union No. 28
Sheet Metal Workers, Local Union No. 137
UA Steamfitters, Local Union No. 638
Teamsters, Local Union No. 282
Tile, Marble & Terrazzo, B.A.C. Local Union No. 7

SCHEDULE "A" - CBAs

Union	Current Agreement w/
Architectural and Ornamental Iron Workers Local Union 580, AFL-CIO	Allied Building Metal Industries, Inc.
Building, Concrete, Excavating & Common Laborers Local 731	Independent
Building, Concrete, Excavating & Common Laborers Local 731	Members of the General Contractors Association of New York, Inc.
Bricklayers Local 1 of the International Union of Bricklayers and Allied Craftworkers	Independent
District Council No. 9, I.U.P.A.T Glaziers Local 1087	Window and Plate Glass Dealers Association
Drywall Tapers and Painters Local 1974, affiliated with International Union of Painters & Allied Trades and Drywall Taping Contractor's Association & Association of Wall-Ceiling & Carpentry Industries NY, Inc.	Independent
Enterprise Association of Steamfitters and Apprentices Local 638	Mechanical Contractors Association of NY, Inc.
Enterprise Association of Steamfitters and Apprentices Local 638	Independent
Elevator Constructors Local 1 of NY and NJ	ThyssenKrupp Elevator Corporation
Elevator Constructors Local 1 of NY and NJ	Independent
Highway Road and Street Laborers Local Union 1010 of the District Council of Pavers and Road Builders of the Laborers' International Union of North America AFL-CIO	Independent
Highway Road and Street Laborers Local Union 1010 of the District Council of Pavers and Road Builders of the Laborers' International Union of North America AFL-CIO	Member of the General Contractors Association of New York, Inc.
International Association of Heat and Frost Insulators and Allied Workers Local No. 12 of New York City	Independent
International Association of Heat and Frost Insulators and Allied Workers Local No. 12 of New York City	The Insulation Contractors Association of New York City, Inc.

International Association of Heat and Frost Insulators and Allied Workers Local No. 12A of New York City	Independent
International Association of Heat and Frost Insulators and Allied Workers Local No. 12A of New York City	Environmental Contractors Association, Inc.
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO, Local Lodge No. 5	Boilermakers Association of Greater New York
Local Union No. 3 International Brotherhood of Electrical Workers, AFL-CIO	New York Electrical Contractors Association
International Brotherhood of Teamsters, Local 282, High Rise Contract	Building Contractors Association & Independents
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	Cement League
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	Independent
Local 8 Roofers, Waterproofers & Allied Workers	Roofing and Waterproofing Contractors Association of New York and Vicinity
Local Union 1 of the United Association of Journeymen and Apprentices of the Pipe Fitting Industry of the United States and Canada	Association of Contracting Plumbers of the City of New York
Local Union Number 40 & 361 of Bridge, Structural Ornamental and Reinforcing Iron Workers AFL-CIO	Independent
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Building Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Interior Demolition Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Independent
Mason Tenders DC & Laborers' International Union – Local 78 & 79	NYCDCA

Mason Tenders DC & Laborers' International Union – Local 78 & 79	Environmental Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	ABMC
Operative Plasterers' and Cement Masons' International Association Local No. 262	Independent
Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	Independent
Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	The Association of Master Painters & Decorators of NY, Inc. and The Association of Wall, Ceiling & Carpentry Industries of NY, Inc. and The Window and Plate Glass Dealers Association
Sheet Metal Workers' International Association, Local 28	Sheet Metal & Air Conditioning Contractors Association of New York City, Inc.
Sheet Metal Workers' International Association, Local 137	The Greater New York Sign Association
Structural Steel and Bridge Painters Local 806, DC 9 International Union of Painters and Allied Trades, AFL-CIO	New York Structural Steel Painting Contractors Association
Teamsters Local 813	Independent
Teamsters Local 813	IESI NY Corporation
The Cement Masons' Union, Local 780	Cement League
The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Cement League
The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local No. 1556	Concrete Contractors of NY

The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Millwright Local 740	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Manufacturing Woodworkers Association of Greater New York Incorporated
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Hoisting Trade Association of New York, Inc.
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Test Boring Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	Building Contractors Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Association of Wall-Ceiling & Carpentry Industries of New York, Incorporated
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners	The Cement League
The District Council of NYC and Vicinity of the United Brotherhood of Carpenters and Joiners of America	New York City Millwright Association

The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners	Greater New York Floor Covering Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Association of Architectural Metal & Glass
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Concrete Contractors of NY
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Building Construction Carpenters	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Local 2287	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Shop Carpenters	Independent
The Tile Setters and Tile Finishers Union of New York and New Jersey, Local 7 of the International Bricklayers and Allied Craftworkers	The Greater New York and New Jersey Contractors Association
United Derrickmen & Riggers Association, Local 197 of NY, LI, Westchester & Vicinity	Contracting Stonesetters Association Inc.
United Derrickmen & Riggers Association Local 197 of NY, LI, Westchester and Vicinity	Building Stone and Pre-cast Contractors Association

Exhibit A

Project Labor Agreement - Letter of Assent

Dear: _____

The undersigned party confirms that it agrees to be a party to and be bound by the New York Agency, Project Labor Agreement as such Agreement may, from time to time, be amended by the parties or interpreted pursuant to its terms. The terms of the Project Labor Agreement, its Schedules, Addenda and Exhibits are hereby incorporated by reference herein.

The undersigned, as a Contractor or Subcontractor (hereinafter Contractor) on the Project known as the NYC Agency Renovation and located at Rego Park Library - New Facility (hereinafter PROJECT), for and in consideration of the award to it of a contract to perform work on said PROJECT, and in further consideration of the mutual promises made in the Project Labor Agreement, a copy of which was received and is acknowledged, hereby:

(1) Accepts and agrees to be bound by the terms and conditions of the Agreement, together with any and all schedules; amendments and supplements now existing or which are later made thereto:

(2) Agrees to be bound by the legally established collective bargaining agreements; local trust agreements for employee benefit funds; and trust documents for joint apprentice programs as well as apprentice program rules and procedures but only to the extent of Program Work and as required by the PLA.

(3) Authorizes the parties to such local trust agreements to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor but only to the extent of Program Work as required by the PLA.

(4) Certifies that it has no commitments or agreements that would preclude its full and complete compliance with the terms and conditions of said Agreement. The Contractor agrees to employ labor that can work in harmony with all other labor on the Project and shall require labor harmony from every lower tier subcontractor it has engaged or may engage to work on the Project. Labor harmony disputes/issues shall be subject to the Labor Management Committee provisions.

(5) Agrees to secure from any Contractor(s) (as defined in said Agreement) which is or becomes a Subcontractor (of any tier), to it, a duly executed Agreement to be Bound in from identical to this document.

Provide description of the Work, identify craft jurisdiction(s) and all contract numbers below:

Local Union: _____

Description of Work: Rego Park Library - New Facility

_____

Contract Number(s): LQQ122-RG

Dated: 01/14/25

Stalco Construction, Inc.
(Name of CM; GC; Contractor or Higher Level Subcontractor)

(Signature)

Stalco Construction, Inc.
(Name of Contractor or subcontractor)

Alan Nahmias - President
(Authorized Officer & Title)

1316 Motor Pkwy., Islandia, NY 11749
(Address)

631-254-6767 / 631-254-8015
(Phone) (Fax)

Contractor's State License
N/A

Sworn to before me this
14 day of January, 2025

Notary Public

PATRICIA ANNE NEVIN
Notary Public - State of New York
No. 01NE6392027
Qualified in Suffolk County
My Commission Expires May 20, 2027

Exhibit B

NEW YORK CITY BUILDING AND CONSTRUCTION TRADES COUNCIL STANDARDS OF EXCELLENCE

The purpose of this Standard of Excellence is to reinforce the pride of every construction worker and the commitment to be the most skilled, most productive and safest workforce available to construction employers and users in the City of New York. It is the commitment of every affiliated local union to use our training and skills to produce the highest quality work and to exercise safe and productive work practices.

The rank and file members represented by the affiliated local unions acknowledge and adopt the following standards:

- ***Provide a full day's work for a full days pay;***
- ***Safely work towards the timely completion of the job;***
- ***Arrive to work on time and work until the contractual quitting time;***
- ***Adhere to contractual lunch and break times;***
- ***Promote a drug and alcohol-free work site;***
- ***Work in accordance with all applicable safety rules and procedures;***
- ***Allow union representatives to handle job site disputes and grievances without resort to slowdowns, or unlawful job disruptions;***
- ***Respect management directives that are safe, reasonable and legitimate;***
- ***Respect the rights of co-workers;***
- ***Respect the property rights of the owner, management and contractors.***

The Unions affiliated with the New York City Building and Construction Trades Council will expect the signatory contractors to safely and efficiently manage their jobs and the unions see this as a corresponding obligation of the contractors under this Standard of Excellence. The affiliated unions will expect the following from its signatory contractors:

- ***Management adherence to the collective bargaining agreements;***
- ***Communication and cooperation with the trade foremen and stewards;***
- ***Efficient, safe and sanitary management of the job site;***
- ***Efficient job scheduling to mitigate and minimize unproductive time;***
- ***Efficient and adequate staffing by properly trained employees by trade;***
- ***Efficient delivery schedules and availability of equipment and tools to ensure efficient job progress;***
- ***Ensure proper blueprints, specifications and layout instructions and material are available in a timely manner***
- ***Promote job site dispute resolution and leadership skills to mitigate such disputes;***
- ***Treatment of all employees in a respectful and dignified manner acknowledging their contributions to a successful project.***

The affiliated unions and their signatory contractors shall ensure that both the rank and file members and the management staff shall be properly trained in the obligations undertaken in the Standard of Excellence.

Exhibit "C" - HireNYC Construction Careers

(August 2020 version)

Non-exhaustive list of zip codes where at least 15% of the individuals are below the federal poverty rate
(Zip codes within ~100 mile radius of NYC)

Zip Code	Borough	Neighborhood
10001	Manhattan	Midtown South
10002	Manhattan	Chinatown
10009	Manhattan	East Village
10025	Manhattan	Manhattan Valley
10026	Manhattan	Central Harlem
10027	Manhattan	Manhattanville
10029	Manhattan	East Harlem
10030	Manhattan	Central Harlem
10031	Manhattan	Hamilton Heights
10032	Manhattan	Inwood and Washington Heights
10033	Manhattan	Washington Heights
10034	Manhattan	Inwood
10035	Manhattan	East Harlem
10037	Manhattan	Central Harlem
10038	Manhattan	Lower Manhattan
10039	Manhattan	Central Harlem
10040	Manhattan	Inwood and Washington Heights
10301	Staten Island	St. George
10302	Staten Island	Port Richmond
10303	Staten Island	Mariner's Harbor
10304	Staten Island	Stapleton
10310	Staten Island	West Brighton
10451	Bronx	Concourse Village
10452	Bronx	High Bridge
10453	Bronx	University Heights
10454	Bronx	Mott Haven
10455	Bronx	Longwood
10456	Bronx	Melrose
10457	Bronx	Central Bronx
10458	Bronx	Bedford Park
10459	Bronx	Morrisania
10460	Bronx	East Tremont
10462	Bronx	Parkchester
10463	Bronx	Kingsbridge
10466	Bronx	Wakefield
10467	Bronx	Norwood
10468	Bronx	Bronx Park and Fordham
10472	Bronx	Unionport
10473	Bronx	Soundview
10474	Bronx	Hunts Point

PLA Exhibit C - HireNYC Construction Careers

(August 2020 version)

Non-exhaustive list of zip codes where at least 15% of the individuals are below the federal poverty rate

(Zip codes within ~100 mile radius of NYC)

Zip Code	Borough	Neighborhood
11101	Queens	Long Island City
11102	Queens	Northwest Queens
11106	Queens	Ravenswood
11203	Brooklyn	East Flatbush
11204	Brooklyn	Borough Park
11205	Brooklyn	Fort Greene
11206	Brooklyn	East Williamsburg
11207	Brooklyn	East New York
11208	Brooklyn	East New York / Cypress Hills
11211	Brooklyn	Williamsburg
11212	Brooklyn	Brownsville
11213	Brooklyn	Crown Heights
11214	Brooklyn	Bensonhurst
11216	Brooklyn	Central Brooklyn
11218	Brooklyn	Kensington
11219	Brooklyn	Borough Park
11220	Brooklyn	Sunset Park
11221	Brooklyn	Bushwick
11223	Brooklyn	Gravesend
11224	Brooklyn	Coney Island
11225	Brooklyn	Prospect Lefferts Gardens
11226	Brooklyn	Prospect Park South
11230	Brooklyn	Midwood
11232	Brooklyn	Sunset Park
11233	Brooklyn	Ocean Hill
11235	Brooklyn	Brighton Beach
11237	Brooklyn	Bushwick and Williamsburg
11239	Brooklyn	Starrett City
11354	Queens	Downtown Flushing
11355	Queens	Queensboro Hill
11368	Queens	South Corona
11369	Queens	East Elmhurst
11373	Queens	Elmhurst
11416	Queens	Southwest Queens
11417	Queens	Ozone Park
11418	Queens	Richmond Hill
11430	Queens	Ozone Park
11432	Queens	Jamaica Center
11433	Queens	South Jamaica
11435	Queens	Briarwood
11691	Queens	Far Rockaway
11692	Queens	Arverne

Data Source: 2013-2017 American Community Survey 5-year estimates

PLA Exhibit C - HireNYC Construction Careers

(August 2020 version)

Non-exhaustive list of zip codes where at least 15% of the individuals are below the federal poverty rate

(Zip codes within ~100 mile radius of NYC)

Zip Code	State	City or Town
06401	CT	Ansonia
06510	CT	New Haven
06511	CT	New Haven
06513	CT	New Haven
06515	CT	New Haven
06519	CT	New Haven
06604	CT	Bridgeport
06605	CT	Bridgeport
06607	CT	Bridgeport
06608	CT	Bridgeport
06610	CT	Bridgeport
06702	CT	Waterbury
06704	CT	Waterbury
06705	CT	Waterbury
06706	CT	Waterbury
06708	CT	Waterbury
06710	CT	Waterbury
06810	CT	Danbury
07002	NJ	Bayonne
07017	NJ	East Orange
07018	NJ	East Orange
07022	NJ	Fairview
07026	NJ	Garfield
07029	NJ	Harrison
07047	NJ	North Bergen
07050	NJ	Orange
07055	NJ	Passaic
07060	NJ	Plainfield
07062	NJ	Plainfield
07087	NJ	Union City
07093	NJ	West New York
07102	NJ	Newark
07103	NJ	Newark
07104	NJ	Newark
07105	NJ	Newark
07106	NJ	Newark
07107	NJ	Newark
07108	NJ	Newark
07111	NJ	Irvington
07112	NJ	Newark
07114	NJ	Newark
07201	NJ	Elizabeth
07202	NJ	Elizabeth
07206	NJ	Elizabethport
07208	NJ	Elizabeth
07304	NJ	Jersey City
07305	NJ	Jersey City
07306	NJ	Jersey City
07307	NJ	Jersey City
07310	NJ	Jersey City

PLA Exhibit C - HireNYC Construction Careers

(August 2020 version)

Non-exhaustive list of zip codes where at least 15% of the individuals are below the federal poverty rate

(Zip codes within ~100 mile radius of NYC)

Zip Code	State	City or Town
07501	NJ	Paterson
07502	NJ	Paterson
07503	NJ	Paterson
07504	NJ	Paterson
07505	NJ	Paterson
07513	NJ	Paterson
07514	NJ	Paterson
07522	NJ	Paterson
07524	NJ	Paterson
07608	NJ	Teterboro
07703	NJ	Fort Monmouth
07712	NJ	Asbury Park
07727	NJ	Farmingdale
07734	NJ	Keansburg
07740	NJ	Long Branch
07820	NJ	Allamuchy
07939	NJ	Lyons
08031	NJ	Bellmawr
08045	NJ	Lawnside
08095	NJ	Winslow
08102	NJ	Camden
08103	NJ	Camden
08104	NJ	Camden
08105	NJ	Camden
08110	NJ	Pennsauken
08217	NJ	Elwood
08224	NJ	New Gretna
08608	NJ	Trenton
08609	NJ	Trenton
08611	NJ	Trenton
08618	NJ	Trenton
08638	NJ	Trenton
08701	NJ	Lakewood
08751	NJ	Seaside Heights
08808	NJ	Broadway
08861	NJ	Perth Amboy
08901	NJ	New Brunswick
10545	NY	Maryknoll
10550	NY	Mount Vernon
10601	NY	White Plains
10701	NY	Yonkers
10703	NY	Yonkers
10705	NY	Yonkers
10801	NY	New Rochelle
10927	NY	Haverstraw
10932	NY	Howells
10940	NY	Middletown
10950	NY	Monroe
10952	NY	Monsey
10963	NY	Otisville
10977	NY	Spring Valley

PLA Exhibit C - HireNYC Construction Careers

(August 2020 version)

Non-exhaustive list of zip codes where at least 15% of the individuals are below the federal poverty rate

(Zip codes within ~100 mile radius of NYC)

Zip Code	State	City or Town
11096	NY	Inwood
11550	NY	Hempstead
11556	NY	Uniondale
11713	NY	Bellport
11798	NY	Wyandanch
11951	NY	Mastic Beach
11970	NY	South Jamesport
12401	NY	Kingston
12416	NY	Chichester
12419	NY	Cottekill
12427	NY	Elka Park
12428	NY	Ellenville
12432	NY	Glasco
12457	NY	Mount Tremper
12475	NY	Ruby
12489	NY	Wawarsing
12490	NY	West Camp
12491	NY	West Hurley
12516	NY	Copake
12550	NY	Newburgh
12561	NY	New Paltz
12583	NY	Tivoli
12589	NY	Wallkill
12594	NY	Wingdale
12601	NY	Poughkeepsie
12701	NY	Monticello
12725	NY	Claryville
12729	NY	Cuddebackville
12732	NY	Eldred
12733	NY	Fallsburg
12743	NY	Highland Lake
12747	NY	Hurleyville
12749	NY	Kauneonga Lake
12751	NY	Kiamesha Lake
12754	NY	Liberty
12758	NY	Livingston Manor
12759	NY	Loch Sheldrake
12762	NY	Mongaup Valley
12763	NY	Mountain Dale
12779	NY	South Fallsburg
12780	NY	Sparrow Bush
19007	PA	Bristol
19123	PA	Philadelphia
19125	PA	Philadelphia
19134	PA	Philadelphia
19135	PA	Philadelphia
19136	PA	Philadelphia
19137	PA	Philadelphia

Data Source: 2013-2017 American Community Survey 5-year estimates

EXHIBIT "D"
MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING, entered into as of _____, between the City of New York ("City") with an office located at City Hall, New York, NY 10007, the Building and Construction Trades Council of Greater New York and Vicinity ("BCTC"), on its behalf and on behalf of its affiliated unions, with its principal place of business located at 350 West 31s[t] Street, New York, NY 10001, and the Building Trade Employers' Association of New York City ("BTEA"), on its behalf and on behalf of its affiliated contractors, with its principal place of business located at 1325 Avenue of the Americas, New York, NY 10019.

WHEREAS, since 2009, the City, the BCTC, and the BTEA have entered into Memoranda of Understanding (each an "MOU"), contemporaneous to the City entering to Project Labor Agreements with the BCTC (each a "PLA"), setting goals on new apprenticeship opportunities for graduates of direct entry pre-apprenticeship programs for low-income New Yorkers, minorities, high school students, women, veterans, NYCHA residents, and qualified employees of Minority- and Women-Owned Business Enterprises ("M/WBEs") that become signatory to the union, and have provided increased opportunities for New Yorkers to have access to good union construction careers;

WHEREAS, in 2014, the City and the BCTC entered into an MOU related to the New York City Build It Back Program and committed to encourage contractors and subcontractors to employ Sandy-impacted residents and for the City and the BCTC to work together with community-based organizations to recruit and train New York City residents, with an emphasis on Sandy-impacted low income residents;

WHEREAS, the BCTC and the BTEA committed to: (i) promote the representation of veterans, women, high school graduates of the City's public schools, and New Yorkers in need of economic opportunity in apprenticeship programs jointly sponsored by BCTC unions and BTEA contractors, and (ii) improve workforce training and development for entrance into the construction industry;

WHEREAS, in 2014, the City of New York issued *Career Pathways: One City Working Together,* with a commitment to maximize local job opportunities through the City's contracts, and as such the City is committed to ensuring that low-income New Yorkers have access to the good jobs and careers that are created through the City's capital investments and through this MOU and contemporaneous PLA, the City the BCTC, and with the cooperation of the BTEA contractors can connect low-income New Yorkers to good prevailing wage construction careers;

WHEREAS, through this MOU and contemporaneous PLAs, the City, the BCTC, and the BTEA commit to recruiting in low-income communities, providing opportunities through pre-apprenticeship and apprenticeship programs for access to construction careers, and ensuring residents of low-income communities, including apprentices, are provided opportunities to work on publicly-funded and -assisted construction projects;

WHEREAS, pursuant to Local Law 1 of 2013, the City is also committed to its M/WBE program, and in partnership with the M/WBE Leadership Association seeks to encourage eligible companies to certify as M/WBEs, and provides a wide range of training and technical assistance to build the capacity of its certified companies to bid successfully for the City's contracts and subcontracts;

WHEREAS, an important element in the success of pre-apprenticeship and apprenticeship programs, as well as in creating work opportunities for contractors and sub-contractors in New York City, is the availability of work on publicly funded and assisted projects; and

WHEREAS, the parties to this MOU desire to publicly state their intentions with respect to apprenticeship programs and the creation of contracting and other economic opportunities in the construction industry.

NOW, THEREFORE, the City, the BCTC, and the BTEA state as follows:

1. Scope. This MOU:

a. States the intentions of the City, the BCTC, and the BTEA regarding:

a. the provision of opportunities in apprenticeship programs jointly sponsored by BCTC unions and BTEA contractors;
b. the City's application of apprenticeship requirements in City construction contracts from the time of execution through December 31, 2024;
c. the joint goal of the City, the BCTC, and the BTEA to create employment opportunities, including apprenticeships, in the construction industry; and

b. Shall terminate on December 31, 2024

2. To facilitate the commitments set forth in this MOU, each Local Union shall designate a HireNYC Construction Careers lead representative to work in partnership with the Mayor's Office of Workforce Development ("WKDEV") to implement these workforce and apprenticeship provisions within the union and across City construction contracts.

3. The BCTC and the BTEA shall work collaboratively with the City to reserve at least 500 new apprenticeship positions each calendar year through both the general recruitment and direct entry programs for New York City residents living in zip codes where at least 15% of the individuals in such zip code are below the federal poverty rate and NYCHA residents regardless of zip code.

4. The BCTC and BTEA shall work collaboratively with the City to reserve new apprenticeship positions each year for direct entry.

a. New York State Department of Labor ("NYSDOL") approved Direct Entry programs may be used by sponsors of Registered Apprenticeship programs as another way to bring apprentices into their programs. It is a tool to help sponsors reach underrepresented populations. Direct Entry provides individuals who successfully complete an apprenticeship preparation program, and who meet the minimum requirements for a NYS Registered Apprenticeship program, with the direct opportunity for an interview with the sponsor of a program bypassing the general recruitment scheduled for the Apprentice Programs.

5. Apprenticeship programs jointly sponsored by Local Unions and employers affiliated with the BTEA shall, subject to approval by the NYSDOL and to the extent consistent with applicable

consent decrees, court orders or similar mandates, reserve up to the following percentages of their new apprenticeships (some apprentices may be counted in more than one category) for direct entry each year:

a. 20% for graduates of New York City public high school who have completed pre-apprenticeship training provided by The Edward J. Malloy Initiative for Construction Skills ("C-SKILLS");

b. 10% for veterans of the U.S. Armed Forces who are referred by New York City Helmets to Hardhats ("NYC H2H"), provided, however, that any veterans whose qualifications allow them to enter unions as journeypersons shall be counted toward the fulfillment of this percentage;

c. 15% for women who have completed pre-apprenticeship training provided by Nontraditional Employment for Women ("NEW");

d. 10% for NYCHA and Section 8 residents who have completed pre-apprenticeship training provided by C-SKILLS, NEW, the NYCHA Resident Training Academy ("NRTA"), or Pathways to Apprenticeships ("P2A");

e. 10% for justice-involved individuals who have completed pre-apprenticeship training provided by C-SKILLS, NEW, NRTA, or P2A; and

f. 5% for qualified employees of certified minority- and women-owned business enterprises and other employers not signatory to collective bargaining agreements of unions affiliated with the BCTC which become signatory to such collective bargaining agreements, provided, however, that any such employees whose qualifications allow them to enter unions as journeypersons shall be counted toward the fulfillment of this percentage.

6. To help reach the goals set forth in paragraph 3, 4, and 5, the City, the BCTC and the BTEA will work cooperatively to identify and pursue appropriate sources of public and private funds and resources, as needed, to provide pre-apprenticeship training scaled to support the goals targeting at least seven hundred (700) pre-apprenticeship positions cumulatively for all above named direct entry programs each year. The City will help coordinate recruitment within the zip codes and target populations identified in paragraphs 3, 4 and 5.

7. The goals in Paragraphs 3, 4, and 5 are aggregate goals for apprenticeship programs jointly sponsored by the Local Unions and BTEA contractors to achieve on an annual basis through their general recruitments and direct entry programs. The City recognizes that different apprenticeship programs face different circumstances and have varying capacities to meet the percentages set forth in each category; notwithstanding that, the BCTC and the BTEA agree to encourage and support meeting the goals in Paragraphs 3, 4, and 5, and to work with apprenticeship programs jointly sponsored by their affiliated unions and contractors to take affirmative steps to achieve that goal.

8. The City, BCTC, and BTEA acknowledge that on federally funded projects NYCHA, and the City on certain federally funded projects, must comply with Executive Order 11246

and federal regulations contained at 24 CFR Part 135 ("Section 3") regarding efforts to employ residents of NYCHA developments and other Section 3 populations.

9. The City, the BCTC, and the BTEA will jointly seek any necessary waivers from NYSDOL with respect to direct entry goals for the joint apprentice programs, as well as jointly support and encourage 100% participation of all affiliated joint apprentice programs.

10. Reporting.

    a. Each Local Union shall provide, or cause to be provided by their Apprentice Directors, copies of the following reports to WKDEV within thirty (30) days of the submission to NYSDOL:

        i. *Apprentice Training Recruitment Notification and Minimum Qualifications (AT 505)* submissions to NYSDOL;
        ii. *Apprentice Training Program Affirmative Action Plan (AT 603)* submissions to NYSDOL; and
        iii. *Apprenticeship Agreement (AT 401)* submissions to NYSDOL.

    b. Pre-apprenticeship programs funded in part by the City will provide quarterly reports, beginning at the end of the first quarter after the first class is held, to the WKDEV with detailed information as required by NYC's Workforce Common Metrics reporting for all individuals trained in all classes.

    c. On an annual basis, beginning on January 1, 2021, the City shall provide an electronic report to the BCTC that contains a list of contracts registered in the previous full fiscal year that were subject to either a City Project Labor Agreement or the Apprenticeship Directive. Such list shall contain the following for each contract:

        i. contracting agency
        ii. contract name;
        iii. prime contractor name;
        iv. registered dollar amount; and
        v. date of registration.

    d. Upon mutual agreement, the parties may modify these reporting requirements, as needed.

11. **City of New York Apprenticeship Directive.** As a means of expanding the pool of work available to apprentices and graduates of state-approved apprenticeship programs providing opportunities to the groups of individuals designated in Paragraphs 3 and 5 above, the City states its intention to implement, as may be amended from time to time, the Directive, attached as Exhibit A. The Directive directs City agencies, for construction contracts where either (i) the cost estimate of the contract exceeds $3 million, or (ii) the cost estimate of the contract exceeds $2 million on a project with a cost estimate of at least $5 million, and for such other contracts as the bidding agency determines to be appropriate, to require the contractor and any of its subcontractors with subcontracts worth at least $2 million to have apprenticeship agreements appropriate for the type and scope of work to be performed that have been registered with, and approved by, the New York State

Commissioner of Labor, and shall have passed any required probationary period and recertification established by the New York State DOL.

12. The City shall include a statement concerning the applicability of the Directive in every City Record notice of the solicitation or award of a contract for a public works project. Within five (5) days of the issuance of any waiver from the apprenticeship requirement, the City shall notify the BCTC and the BTEA, in writing or electronically, of the granting of such waiver and the reasons therefore.

13. The City, the BCTC, and the BTEA look forward to working together and with the contractor community in a spirit of cooperation and good will toward the goal that all New Yorkers from diverse backgrounds, particularly minorities, women, returning veterans, recent public high school graduates, NYCHA residents, individuals in need of economic opportunity, and justice-involved individuals, are well-prepared for participation in the workforce and can gain access to good careers in the construction industry, in both the private and public sectors.

For the City of New York

By: _____

First Deputy Mayor, Dean Fuleihan

For Building and Construction Trades Council of Greater New York and Vicinity

By: _____

Gary LaBarbera, President

For Building Trades Employers' Association of New York City

By: _____

Louis J. Coletti, President & CEO

SCHEDULE "B" - DRUG AND ALCOHOL POLICY

PREAMBLE

WHEREAS, [CONSTRUCTION MANAGER] ("Construction Manager"), for the construction project located at [PROJECT ADDRESS] ("Project") desires to provide for a safe, drug and alcohol-free work site for the Project;

WHEREAS, the parties have entered into a separate Project Labor Agreement for the Project and have agreed to negotiate in good faith a Project Drug & Alcohol Testing Policy;

WHEREAS, this Testing Policy is collectively negotiated between the Construction Manager and the New York City Building and Construction Trades Council ("Council") (the Construction Manager and BCTC are collectively referred to hereafter as the "Parties");

WHEREAS, the Parties each currently have respective drug and alcohol policies, including the Projects' Zero-Tolerance policy;

WHEREAS, the Parties desire to maximize project safety conditions for the Project personnel and public, as well as deter violations of the Parties' respective drug and alcohol policies;

NOW, THEREFORE, the Parties agree to this Policy as of the date hereof,

ARTICLE 1 - PARTIES

This Drug & Alcohol Testing Policy ("Policy") is hereby established by the Construction Manager and the Council, on behalf of itself and its affiliated local union members, and the signatory local unions on behalf of themselves and their members.

ARTICLE 2-GENERAL CONDITIONS

SECTION 2.1 - SUMMARY

In order to reinforce the Parties' respective drug and alcohol policies, including the Projects' zero tolerance policy regarding the prohibition of the use of drugs and alcohol, and to deter Project personnel from violating those policies, the Parties agree that all Project Personnel (defined later) will be required to submit to drug and/or alcohol testing randomly, post-accident, and for reasonable suspicion.

Any individual on site that violates this Policy is subject to disciplinary action, including, without limitation, loss of site access privileges.

SECTION 2.2 - REVOCATION OF PROJECT ACCESS PRIVILEGES

Any one of the following occurrences will result in the immediate revocation of a Project Personnel's project access privileges:

1. An individual is found selling or using drugs or alcohol, or otherwise is under the influence of drugs or alcohol, subject to the other terms of this Policy, on a Project Site;
2. An individual has been convicted under any criminal drug or alcohol statute for a violation occurring in the workplace within the past two years;
3. An individual who refuses to abide by the Projects' drug and alcohol policy, or refuses to submit to a test in accordance with this Policy;
4. An individual who switches, adulterates, or in any way tampers with a specimen

required to be submitted in accordance with this Policy.

SECTION 2.3 - DEFINITIONS

Confirmed Positive Test: The presence of drugs, drug metabolites, or alcohol in a person's body that equals or exceeds the established cut off levels as defined in Exhibit I. For drugs, the sample will have undergone Laboratory screening and confirmation testing and must have been verified as positive by a Medical Review Officer. A positive test result for alcohol obtained through Evidential Breath Testing is considered a Confirmed Positive Test.

Employee Assistance Program (EAP): An EAP is generally considered a workplace-based, confidential program designed to help employees deal effectively with a variety of personal problems, and, of relevance to this policy, substance abuse problems. The EAP promotes assessments and short-term counseling. An EAP shall also include any similar education or rehabilitation program provided by the Councilor its respective members. The Project Personnel that are required to participate in the EAP shall be responsible for the cost of their consultation with an EAP and/or participation in any education or rehabilitation program.

Evidential Breath Testing Device (EBT): A device that is used to measure alcohol in the breath and which meets National Highway Traffic Safety Administration's specifications for precision and accuracy.

Laboratory: A laboratory that is SAMHSA (Substance Abuse and Mental Health Services Administration) certified for the testing of drugs.

Medical Review Officer (MRO): A licensed physician responsible for receiving laboratory results generated by an employer's drug testing plan who has knowledge of substance abuse disorders and medical training to interpret and evaluate a donor's confirmed positive test result together with his/her medical history and all other relevant information.

Previous Worker: All individuals whose employment relationship with the contractor, company or organization no longer exists.

Project Site: The construction area for respective Project.

Reasonable Suspicion: When a qualified trade contractor, the Developer or Construction Manager as set forth in Section 3.7, reasonably believes that an individual has violated this Policy. Reasonable suspicion is based upon (1) specific, current, behavioral or performance indicators, (2) the possible manufacture, distribution, consumption or possession of unauthorized drugs, drug paraphernalia, or alcohol, or (3) documented investigation by an agency retained by, or otherwise independent from, the Developer or Construction Manager.

SECTION 2.4 - INCLUDED SUBJECTS

This Policy shall cover all employees of the Owner, Construction Manager and Project trade contractors, their subcontractors and any other of their respective personnel at any level that are performing any activity at a Project Site, inclusive of managers, superintendents and supervisors, except as specifically excluded by Section 2.5 of this Policy (collectively and singularly, "Project Personnel").

SECTION 2.5 - EXCLUDED SUBJECTS

The following persons are not subject to the provisions of this Policy:

A. Employees and entities engaged in off-site manufacture, modifications, repair,

maintenance, assembly, painting, handling or fabrication of components, materials, equipment or machinery;

B. Vendors and employees of vendors engaged on a Project Site in equipment testing, inspection, training, warranty work, or engaged in corrections of defective or nonconforming work, unless such employees are expressly included in the bargaining unit of a local signatory to this Agreement;

C. Employees engaged in ancillary work on a Project which is performed by third parties, such as electric utilities, gas utilities, telephone companies, and railroads, or any other work not constituting Project work;

D. Employees of any governmental authority (state, local or otherwise);

E. Employees and contractors engaged in work on the Project Site as part of due diligence or monitoring, which work is ancillary to Project work; and

F. Emergency responders.

SECTION 2.6 - PRESCRIPTION AND NON-PRESCRIPTION DRUGS

The use of prescription drugs not prescribed directly to Project Personnel is prohibited, including the use of drugs prescribed to a spouse or domestic partner. The use of non-prescription drugs that are sold outside the United States and that contain substances that are illegal or require a prescription in the United States are prohibited, unless prescribed by a licensed physician.

SECTION 2.7 - SEARCHES

In order for the Construction Manager to ensure the safety of Project Personnel and for the Construction Manager to protect its assets, the Construction Manager shall have the right upon good cause (such as reasonable suspicion of a violation of this Policy) to conduct reasonable searches for alcohol, drugs and related paraphernalia anywhere within the boundaries of a Project Site. A search may include any assets owned or leased by any Project Personnel that is on a Project Site, including without limitation, vehicles, lockers, gang boxes, desks and personal property brought onto a Project Site, but excluding personal body searches or physical contact with employees.

ARTICLE 3 - DRUG & ALCOHOL TESTING

SECTION 3.1 - COLLECTION PROCESS

As of the execution date of this PLA, Project Personnel may be required to submit urine samples ("Preliminary Drug Screening") for the purpose of detecting the presence of drugs as part of the random, post-accident or reasonable suspicion testing, in accordance with chain of custody protocols as established by Substance Abuse and Mental Health Services Administration (SAMHSA), utilizing an instant result test cup for Preliminary Drug Screenings, such testing is to be performed on-site by an independent service provider. The results from the instant result test cup will be considered preliminary. The sample will be sent to a SAMHSA certified testing laboratory for confirmation.

As of the date hereof, all Project Personnel will be required to submit to an Evidential Breath Test (EBT) for the purpose of detecting the presence of alcohol when submitting to random, post-accident or reasonable suspicion testing. Alcohol testing will not be conducted for pre-access testing.

SECTION 3.2 - NEGATIVE PRELIMINARY DRUG SCREENING

Project Personnel with a negative Preliminary Drug Screening will be considered conditionally accepted for Project site access, pending confirming laboratory results. Site access privileges will be revoked if the subsequent laboratory results determine that the sample has tested positive for drugs or that the sample has been adulterated.

SECTION 3.3 POSITIVE PRELIMINARY DRUG SCREENING

If the Preliminary Drug Screening indicates a positive result, the individual will not be allowed access to the Project Site. The sample will be sent to the certified laboratory for analysis and, if applicable, reviewed by the Medical Review Officer (MRO). If the laboratory confirmation results are also positive, the individual will be considered in violation of this Policy and their site access will be revoked for at least 30 days. If the laboratory confirmation results are negative, the Project Personnel's site access will not be revoked.

SECTION 3.4 CONFIRMED POSITIVE TEST RESULTS

A. POSITIVE DRUG TEST

A drug test is considered positive if the test results exceed the limits shown in Exhibit 1, which is attached hereto and incorporated herein by reference. The test will be confirmed through a second analysis process and reviewed by an MRO before results are reported. Project Personnel with confirmed positive drug test results will have their site access revoked. In case of a "false positive" result, any such Personnel shall be entitled to the reimbursement of any wages lost during the suspension caused by any such false positive result.

B. POSITIVE EBT

An EBT is considered positive if the test results exceed .04 BrAC, or as otherwise set forth in Exhibit 1. Project Personnel with a positive alcohol test result will be subject to the remedies set forth in Exhibit 1.

C. REINSTATEMENT OF SITE ACCESS PRIVILEGES

(a) Subject to section 3.4(C)(a) immediately below, if the site access of a Project Personnel has been revoked pursuant to this Policy, then any such person may request that their site access be reinstated after 30 days, provided that all of the following conditions are met to the reasonable satisfaction of the Construction Manager. :

1. The individual has provided proof of wellness from an accredited rehabilitation facility or has provided proof that treatment isn't needed as attested to by a licensed health care provider specializing in the diagnosis and treatment of alcohol and drug abuse.
2. A current drug and alcohol test is obtained within three (3) days of the request for re-access to the site and proof of a negative test result has been received; and
3. The individual agrees to submit to multiple testing for two (2) full years from the date of gaining re-access to the project, the scheduling of which will be determined at the sole discretion of the Construction Manager. If all of these conditions have been met, the Construction Manager agrees that it will not unreasonably withhold their consent to any such request.

(b) Unlawful possession, concealment, use, purchase, sale, manufacture, dispensation or

distribution of illegal drugs or un-prescribed controlled substances on the Project Site will subject the Project Personnel Employee to immediate removal from the Project Site and shall bar such Project Personnel Employee from returning for a minimum of three (3) months, which return shall, in any event, be subject to the reasonable approval by Construction Manager.

(c) All of the Parties agree that any such Project Personnel will only be entitled to any such reinstatement of site access privileges one time and that any subsequent violation of this Policy will result in the permanent termination of access to the Project Site.

SECTION 3.5 - RANDOM TESTING

A third-party provider designated by the Construction Manager will randomly select by an objective criteria a testing pool for random drug and/or alcohol testing from all Project Personnel with site access cards. Any individual selected for a random drug and/or alcohol test will be required to submit to an Evidential Breath Test (EBT) and/or drug test. Individuals may be tested more than once during any given time period. The Parties acknowledge and agree that an EBT may be required without a drug test and that a drug test may be required without an EBT, as solely determined by the Construction Manager.

If an individual is unable to attend the first scheduled random drug test as a result of being involved in a work-related task, such drug test will be rescheduled and will be completed at or before the conclusion of such employee's then current work shift. If the second drug test is missed for any reason, the incident will be reviewed by the Construction Manager, who shall have the right to terminate the site access privileges of any such Project Personnel until such time as that Project Personnel has complied with this Policy. If the individual refuses to take the test, their access privileges will be immediately terminated for cause.

SECTION 3.6 - POST ACCIDENT TESTING

After each work-related incident or injury requiring the services of a licensed health care provider, all Project Personnel involved with the incident will be required to submit to a drug and/or alcohol test immediately following the incident. In instances where emergency care is necessary, the drug and/or alcohol test shall be obtained by the care facility, if possible, within 24 hours after treatment is rendered. If more than 48 hours have passed before an injury is reported and treated by a licensed health care provider, an alcohol test will not be required.

In addition, any Project Personnel involved in a non-injury related incident at a Project Site with damages at or in excess of $200 will be required to submit to a drug and/or alcohol test unless:

A. It is determined, after conducting an investigation and interviewing all employees involved and any witnesses, that the employee's performance can be completely discounted as a contributing factor to the incident; or
B. It is determined, after conducting an incident investigation and interviewing all employees and any witnesses that the incident was caused by inadequate equipment or system design, and/or premature failure of equipment or system components.

SECTION 3.7 - REASONABLE SUSPICION TESTING

All Project Personnel will be required to submit to a drug and/or alcohol test when there is reasonable suspicion the individual has violated this policy.

Reasonable suspicion includes, without limitation, the following:

A. Violent or irrational behavior;

B. Emotional or physical unsteadiness;

C. Sensory or motor-skill malfunctions;

D. Slurred speech;

E. The odor of alcohol or drugs on clothing or breath in conjunction with other indicators;

F. Possession of alcohol, unauthorized drugs or drug paraphernalia; or

G. Documented evidence of an independent investigation regarding Project Personnel's consumption of what is reasonably believed to be an alcoholic beverage or drugs in violation of the Project's policies and/or this Policy.

Reasonable suspicion testing may only be ordered by supervisory personnel that: (a) have been trained to recognize the above referenced factors; or (b) have received credible documentary evidence from an independent investigator that a Project Personnel has violated a drug and/or alcohol policy. It is agreed that any certified training program shall satisfy the training requirement.

SECTION 3.8 - PRIVACY CONSIDERATIONS

The Parties agree to use reasonable efforts to conduct any testing pursuant to this Policy in accordance with the privacy concerns of Project Personnel. To address these concerns, the Parties agree that:

1. The testing station(s) shall be screened off, or otherwise closed off from public view.
2. All documents and information regarding the testing, including test results, shall be maintained by the respective custodian(s) of record in accordance with their respective privacy policies, which any Project Personnel shall be entitled to review upon timely request.
3. The Parties agree to make a good faith effort to resolve any other privacy concern of Project Personnel regarding this Policy, provided that any such concerns do not interfere with the purpose of this Policy.

ARTICLE 4 – GRIEVANCE

SECTION 4.1 - REPRESENTED WORKERS

Nothing in this Policy shall restrict a member of a signatory local union from filing a grievance in accordance with the member's collective bargaining agreement or a Project Labor Agreement, provided that the grievance shall be limited to whether the removal of a member for violation of this Policy was conducted in compliance with the terms and conditions set forth herein.

SECTION 4.2 - HOLD HARMLESS

The Construction Manager agrees to hold harmless and indemnify the Union/Council and its representatives from any liability that may be incurred as a result of the Company’s Drug and Alcohol Policy to the extent caused by the negligence or intentional misconduct of the Construction Manager.

IN WITNESS WHEREOF the parties have agreed to this Policy as of _____, 20___.

FOR [CONSTRUCTION MANAGER]

By: _____
Name: [INSERT NAME] _____
Title: [INSERT TITLE] _____

FOR GREATER NEW YORK CITY BUILDING TRADES COUNCIL

By: _____
Name: Gary LaBarbera _____
Title: President

EXHIBIT 1

CLASS OF DRUGS TESTED AND THEIR RESPECTIVE CUT-OFF LIMITS

The cut-off limits established are those recommended by the U.S. Department of Health and Human Services in their mandatory Guidelines for Federal Workplace Drug Testing Programs.

Drug Class	Screening Cut-Off Limit (ng/ml)	Confirmation Cut-off Limit (ng/ml)
Amphetamines	1000	500
Benzoylecgonine (Cocaine Metabolite)	300	150
Cannabinoids (THC)	50	15
*Opiates	2000	10
Phencyclidine (PCP)	25	25

Confirmation screening is done by means of GC/MS analysis.

*The GC/MS confirmation for opiates will be for both codeine and morphine separately. If morphine is equal to or greater than 2,000ng/ml then the GC/MS confirmation analysis for 6-acetylmorphine (6-MAM) is at a cut-off level of 10ng/ml.

Alcohol Screening

All Project Personnel will be required to submit to an EBT under the random, post-accident, and reasonable suspicion test arenas, for the purpose of detecting presence of alcohol. If this test supports a positive result for presence of alcohol, the Project Personnel will be considered in violation of this Policy.

If the results of the EBT are:

1. Above 0.001 BrAC, but at or below 0.020 BrAC, a second test will be conducted within approximately 15 minutes.
    - If the second BrAC test is less than the first BrAC, the results will be deemed negative and the Project Personnel may return to work, if there are no other outstanding issues.
    - If the second BrAC is increasing, but below 0.04 BrAC, the results will be deemed negative, but the Project Personnel will be sent home for the day and the Construction Manager shall be notified. If a Project Personnel is sent home two times within a six-month period pursuant to this Section I, then any such Project Personnel shall be deemed to have tested positive and will be subject to the applicable remedies set forth in Section 2 below.
2. Above 0.02 BrAC, but below 0.06 BrAC, a second test will be conducted after approximately 15 minutes.
    - Notwithstanding anything set forth above to the contrary, a Project Personnel may elect to voluntarily go home for the day instead of taking a second test and the results will

be deemed negative, provided that any such Project Personnel may not voluntarily go home more than once within a twelve month period.

- If the second BrAC test is at or below 0.02 BrAC, the results will be deemed negative and the Project Personnel may return to work if there are no other outstanding issues.
- If the second BrAC test is above 0.020, but below 0.06, the results will be deemed positive, the Project Personnel will be sent home for the day and their site access will be revoked for at least five [5] calendar days and until such time as the Project Personnel has been evaluated by an EAP professional skilled in substance abuse and confirmed fit for duty.
- Any Project Personnel who is deemed positive two times within two years pursuant to this Section 2 will have their site access privileges terminated and will be entitled to the limited relief set forth in Section 3 .4(c) of the Policy.

3. At or above .06 BrAC, the Project Personnel will have their site access privileges terminated, after which they will be entitled to the limited relief set forth in Section 3.4(C) of the Policy.

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CITY OF NEW YORK

DEPARTMENT OF DESIGN AND CONSTRUCTION

INFORMATION FOR BIDDERS

December 2021

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CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

INFORMATION FOR BIDDERS

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1. Description and Location of Work

The description and location of the work for which bids are requested are specified in the PASSPort RFx field "Description".

2. Time and Place for Receipt of Bids

Sealed bids shall be received on or before the date and hour specified in the PASSPort RFx, at which time they will be publicly opened and read aloud in the presence of the Commissioner or the Commissioner's or her representative, and any bidders who may desire to be present.

3. Definitions

The definitions set forth in the Procurement Policy Board Rules shall apply to this Invitation For Bids.

4. Invitation For Bids and Contract Documents

(A) Except for titles, sub-titles, headings, running headlines, tables of contents and indices (all of which are printed herein merely for convenience) the following, except for such portions thereof as may be specifically excluded, shall be deemed to be part of the Contract and the Invitation for Bids.

(1) All provisions required by law to be inserted in this Contract, whether actually inserted or not

(2) The Contract Drawings and Specifications

(3) The General Conditions, the General Requirements and the Special Conditions, if any

(4) The Contract

(5) The Information for Bidders; Request for Proposals; Notice of Solicitation and Proposal For Bids; Bid or Proposal, and the Bid Booklet

(6) The Budget Director's Certificate; all Addenda issued prior to the receipt of the bids; the Notice of Award; Performance and Payment Bonds, if required; and the Notice to Proceed with the Work.

(B) For particulars as to this procurement, including quantity and quality of the purchase, extent of the work or labor to be performed, delivery and performance schedule, and any other special instructions, prospective bidders are referred to the Invitation For Bids Documents. A copy of such documents can be obtained in the PASSPort RFx.

5. Pre-Bid Conference

A pre-bid conference shall be held as set forth in the PASSPort RFx. Nothing stated at the pre-bid conference shall change the terms or conditions of the Invitation For Bids Documents, unless a change is made by written amendment as provided in Section 9 below. Failure to attend a mandatory pre-bid conference shall constitute grounds for the rejection of the bid.

6. Agency Contact

Any questions or correspondence relating to this bid solicitation shall be addressed to the Agency Contact person specified in the PASSPort RFx.

7. Bidder's Oath

(A) The bid shall be properly signed by an authorized representative of the bidder and the bid shall be verified by the written oath of the authorized representative who signed the bid, that the several matters stated and information furnished therein are in all aspects true.

(B) A materially false statement willfully or fraudulently made in connection with the bid or any of the forms completed and submitted with the bid may result in the termination of any Contract between the City and the Bidder. As a result, the Bidder may be barred from participating in future City contracts as well as be subject to possible criminal prosecution.

8. Examination and Viewing of Site, Consideration of Other Sources of Information and Changed Conditions

(A) Pre-Bidding (Investigation) Viewing of Site - Bidders must carefully view and examine the site of the proposed work, as well as its adjacent area, and seek other usual sources of information, for they will be conclusively presumed to have full knowledge of any and all conditions on, about or above the site relating to or affecting in any way the performance of the work to be done under the Contract which were or should have been indicated to a reasonably prudent bidder. To arrange a date for visiting the work site, bidders are to contact the Agency Contact person specified in The PASSPort RFx.

(B) Should the contractor encounter during the progress of the work subsurface conditions at the site materially differing from any shown on the Contract Drawings or indicated in the Specifications or such subsurface conditions as could not reasonably have been anticipated by the contractor and were not anticipated by the City, which conditions will materially affect the cost of the work to be done under the Contract, the attention of the Commissioner must be called immediately to such conditions before they are disturbed. The Commissioner shall thereupon promptly investigate the conditions. If the Commissioner finds that they do so materially differ, or that they could not reasonably have been anticipated by the contractor and were not anticipated by the City, the Contract may be modified with the Commissioner's written approval.

9. Examination of Proposed Contract

(A) Request for Interpretation or Correction: Prospective bidders must examine the Contract Documents carefully and before bidding must request the Commissioner in writing for an interpretation or correction of every patent ambiguity, inconsistency or error therein which should have been discovered by a reasonably prudent bidder. Such interpretation or correction, as well as any additional contract provisions the Commissioner may decide to include, will be issued in writing by the Commissioner as an addendum to the Contract, which will be transmitted to each person recorded as having received a copy of the Contract Documents from the Department. Transmission of such addendum will be by mail, e-mail, facsimile or hand delivery. Such addendum will also be posted at the place where the Contract Documents are available for the inspection of prospective bidders. Upon transmission as provided for herein, such addendum shall become a part of the Contract Documents, and binding on all bidders, whether or not actual notice of such addendum is shown.

(B) Only Commissioner's Interpretation or Correction Binding: Only the written interpretation or correction so given by the Commissioner shall be binding, and prospective bidders are warned that no other officer, agent or employee of the City is authorized to give information concerning, or to explain or interpret, the Contract.

(C) Documents given to a subcontractor for the purpose of soliciting the subcontractor's bid shall include either a copy of the bid cover sheet or a separate information sheet setting forth the project name, the Contract number (if available), the contracting agency and the Project's location.

10. Form of Bid

Each bid must be submitted upon the prescribed form and must contain: a) the name, residence and place of business of the person or persons making the same; b) the names of all persons interested therein, and if no other person is so interested, such fact must be distinctly stated; c) a statement to the effect that it is made without any connection with any other person making a bid for the same purpose and that it is in all respects fair and without collusion or fraud; d) a statement that no Council member or other officer or employee or person whose salary is payable in whole or part from the City Treasury is directly or indirectly interested therein or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof; e) a statement that the bidder is not in arrears to the City or to any agency upon a debt or contract or taxes, and is not a defaulter as surety or otherwise upon any obligation to the City to any agency thereof, except as set forth in the bid.

THE BID SHALL BE TYPEWRITTEN OR WRITTEN LEGIBLY IN INK. THE BID SHALL BE SIGNED IN INK. ERASURES OR ALTERATIONS SHALL BE INITIALED BY THE SIGNER IN INK. FAILURE TO CONFORM TO THE REQUIREMENTS OF THIS SECTION 10 SHALL RESULT IN THE REJECTION OF THE BID.

11. Irrevocability of Bid

The prices set forth in the bid cannot be revoked and shall be effective until the award of the Contract, unless the bid is withdrawn as provided for in Sections 15 and 18 below.

12. Acknowledgment of Amendments

The receipt of any amendment to the Contract Documents shall be acknowledged by the bidder in its bid submission.

13. Bid Samples and Descriptive Literature

Bid samples and descriptive literature shall not be submitted by the bidder, unless expressly requested elsewhere in the Contract or Contract Documents. Any unsolicited bid samples or descriptive literature which are submitted shall not be examined or tested and shall not be deemed to vary any of the provisions of this Contract.

14. Proprietary Information/Trade Secrets

(A) The bidder shall identify those portions of the bid which it deems to be confidential, proprietary information or trade secrets, and provide justification why such materials shall not be disclosed by the City. All such materials shall be clearly indicated by stamping the pages on which such information appears, at the top and bottom thereof with the word "Confidential". Such materials stamped "Confidential" must be easily separable from the non-confidential sections of the bid.

(B) All such materials so indicated shall be reviewed by the Agency and any decision not to honor a request for confidentiality shall be communicated in writing to the bidder. For those bids which are unsuccessful, all such confidential materials shall be returned to the bidder. Prices, makes and model or catalog numbers of the items offered, deliveries, and terms of payment shall be publicly available after bid opening, regardless of any designation of confidentiality made by the bidder.

15. Pre-Opening Modification or Withdrawal of Bids

Bids may be modified or withdrawn by written notice received in the office designated in the PASSPort RFx, before the time and date set for the bid opening. If a bid is withdrawn in accordance with this Section, the bid security, if any, shall be returned to the bidder.

16. Bid Evaluation and Award

In accordance with the New York City Charter, the Procurement Policy Board Rules and the terms and conditions of this Invitation For Bids, this Contract shall be awarded, if at all, to the responsible bidder whose bid meets the requirements and evaluation criteria set forth in the Invitation For Bids, and whose bid price is either the most favorable bid price or, if the Invitation For Bids so states, the most favorable evaluated bid price. A bid may not be evaluated for any requirement or criterion that is not disclosed in the Invitation For Bids.

Restriction: No negotiations with any bidder shall be allowed to take place except under the circumstances and in the manner set forth in Section 21. Nothing in this Section shall be deemed to permit a contract award to a bidder submitting a higher quality item than that designated in the Invitation For Bids, if that bid is not also the most favorable bid.

17. Late Bids, Late Withdrawals and Late Modifications

Any bid received at the place designated in the solicitation after the time and date set for receipt of bids is late and shall not be considered. Any request for withdrawal or modification received at the place designated in the solicitation after the time and date set for receipt of bids is late and shall not be considered. The exception to this provision is that a late modification of a successful bid that makes the bid terms more favorable to the City shall be considered at any time it is received.

18. Withdrawal of Bids.

Except as provided for in Section 15, above, a bidder may not withdraw its bid before the expiration of forty-five (45) days after the date of the opening of bids; thereafter, a bidder may withdraw its bid only in writing and in advance of an actual award. If within sixty (60) days after the execution of the Contract, the Commissioner fails to fix the date

for commencement of work by written notice to the bidder, the bidder at the bidder's option, may ask to be relieved of the bidder's obligation to perform the work called for by written notice to the Commissioner. If such notice is given to the Commissioner, and the request to withdraw is granted, the bidder waives all claims in connection with this Contract.

19. Mistake in Bids

(A) Mistake Discovered Before Bid Opening: A bidder may correct mistakes discovered before the time and date set for bid opening by withdrawing or correcting the bid as provided in Section 15 above.

(B) Mistakes Discovered Before Award

(1) In accordance with General Municipal Law (Section 103, subdivision 11), where a unilateral error or mistake is discovered in a bid, such bid may be withdrawn upon written approval of the Agency Chief Contracting Officer if the following conditions are met:

(a) The mistake is known or made known to the agency prior to the awarding of the Contract or within 3 days after the opening of the bid, whichever period is shorter; and

(b) The price bid was based upon an error of such magnitude that enforcement would be unconscionable; and

(c) The bid was submitted in good faith and the bidder submits credible evidence that the mistake was a clerical error as opposed to a judgment error; and

(d) The error in the bid is actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of work, labor, material or services made directly in the compilation of the bid, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of the original work paper, documents, or materials used in the preparation of the bid sought to be withdrawn; and

(e) It is possible to place the agency in the same position as existed prior to the bid.

(2) Unless otherwise required by law, the sole remedy for a bid mistake in accordance with this Article shall be withdrawal of the bid, and the return of the bid bond or other security, if any, to the bidder. Thereafter, the agency may, in its discretion, award the Contract to the next lowest bidder or rebid the Contract. Any amendment to or reformation of a bid or a Contract to rectify such an error or mistake therein is strictly prohibited.

(3) If the mistake and the intended correct bid are clearly evident on the face of the bid document, the bid shall be corrected to the intended correct bid and may not be withdrawn. Examples of mistakes that may be corrected are typographical errors, errors in extending unit prices, transposition errors and arithmetical errors.

20. Low Tie Bids

(A) When two or more low responsive bids from responsible bidders are identical in price, meeting all the requirements and criteria set forth in the Invitation For Bids, the Agency Chief Contracting Officer will break the tie in the following manner and order of priority:

(1) Award to a certified New York City small, minority or woman-owned business entity bidder;

(2) Award to a New York City bidder;

(3) Award to a certified New York State small, minority or woman-owned business bidder;

(4) Award to a New York State bidder.

(B) If two or more bidders still remain equally eligible after application of paragraph (A) above, award shall be made by a drawing by lot limited to those bidders. The bidders involved shall be invited to attend the drawing. A witness shall be present to verify the drawing and shall certify the results on the bid tabulation sheet.

21. Rejection of Bids

(A) Rejection of Individual Bids: The Agency may reject a bid if:

(1) The bidder fails to furnish any of the information required pursuant to Section 24 or 28 hereof; or if

(2) The bidder is determined to be not responsible pursuant to the Procurement Policy Board Rules; or if

(3) The bid is determined to be non-responsive pursuant to the Procurement Policy Board Rules; or if

(4) The bid, in the opinion of the Agency Chief Contracting Officer, contains unbalanced bid prices and is thus non-responsive, unless the bidder can show that the prices are not unbalanced for the probable required quantity of items, or if the imbalance is corrected pursuant to Section 15.

(B) Rejection of All Bids: The Agency, upon written approval by the Agency Chief Contracting Officer, may reject all bids and may elect to resolicit bids if in its sole opinion it shall deem it in the best interest of the City so to do.

(C) Rejection of All Bids and Negotiation With All Responsible Bidders: The Agency Head may determine that it is appropriate to cancel the Invitation For Bids after bid opening and before award and to complete the acquisition by negotiation. This determination shall be based on one of the following reasons:

(1) All otherwise acceptable bids received are at unreasonable prices, or only one bid is received and the Agency Chief Contracting Officer cannot determine the reasonableness of the bid price, or no responsive bid has been received from a responsible bidder; or

(2) In the judgment of the Agency Chief Contracting Officer, the bids were not independently arrived at in open competition, were collusive, or were submitted in bad faith.

(B) When the Agency has determined that the Invitation for Bids is to be canceled and that use of negotiation is appropriate to complete the acquisition, the contracting officer may negotiate and award the Contract without issuing a new solicitation, subject to the following conditions:

(1) prior notice of the intention to negotiate and a reasonable opportunity to negotiate have been given by the contracting officer to each responsible bidder that submitted a bid in response to the Invitation for Bids;

(2) the negotiated price is the lowest negotiated price offered by a responsible bidder; and

(3) the negotiated price is lower than the lowest rejected bid price of a responsible bidder that submitted a bid in response to the Invitation for Bids.

22. Right to Appeal Determinations of Non-Responsiveness or Non-Responsibility and Right to Protest Solicitations and Award

The bidder has the right to appeal a determination of non-responsiveness or non-responsibility and has the right to protest a solicitation and award. For further information concerning these rights, the bidder is directed to the Procurement Policy Board Rules.

23. Affirmative Action and Equal Employment Opportunity

This Invitation For Bids is subject to applicable provisions of Federal, State and Local Laws and executive orders requiring affirmative action and equal employment opportunity.

24. PASSPort COMPLIANCE

All vendors that intend to do business with the City of New York must complete a disclosure process in order to be considered for a contract. This disclosure process was formerly completed using Vendor Information Exchange System (VENDEX) paper-based forms. The City of New York has moved collection of vendor disclosure information online. In early August 2017, the New York City Mayor's Office of Contract Services (MOCS) launched the Procurement and Sourcing Solutions Portal (PASSPort), a new online procurement system that replaced the paper-VENDEX process. In anticipation of awards, all bidders must create online accounts in the new PASSPort system, and

file all disclosure information using PASSPort. Paper submissions, including certifications of no changes to existing VENDEX packages, will not be accepted in lieu of complete online filings using PASSPort.

All vendors that intend to do business with the City, but specifically those that fall into any of the following categories, are required to enroll:

- Have a pending award with a City Agency; or
- Hold a current contract with a City Agency and have either an expiring VENDEX or expiring Certificate of No Change.

The Department of Design and Construction (DDC) and MOCS hereby notifies all proposers that the PASSPort system is available, and that disclosure filing completion is required prior to any award through this competitive bid.

To enroll in PASSPort and to access the PASSPort website (including online training), please visit www.nyc.gov/passport. Contact MOCS at passport@mocs.nyc.gov for additional information and technical support.

25. Complaints About the Bid Process

The New York City Comptroller is charged with the audit of contracts in New York City. Any vendor who believes that there has been unfairness, favoritism or impropriety in the bid process should inform the Comptroller, Office of Contract Administration, One Centre Street, Room 835, New York, New York; telephone number (212)669-2323.

26. Bid, Performance and Payment Security

(A) Bid Security: Each bid must be accompanied by bid security in an amount and type specified in the PASSPort RFx questionnaire. The bid security shall assure the City of New York of the adherence of the bidder to its proposal, the execution of the Contract, and the furnishing of Performance and Payment Bonds by the bidder, if required in the PASSPort RFx. Bid security shall be returned to the bidder as follows:

(1) Within ten (10) days after the bid opening, the Comptroller will be notified to return the deposits of all but the three (3) lowest bidders. Within five (5) days after the award, the Comptroller will be notified to return the deposits of the remaining two unsuccessful bidders.

(2) Within five (5) days after the execution of the Contract and acceptance of the Contractor's bonds, the Comptroller will be notified to return the bid security of the successful bidder or, if performance and payment bonds are not required, only after the sum retained under Article 21 of the Contract equals the amount of the bid security.

(3) Where all bids are rejected, the Comptroller will be notified to return the deposit of the three (3) lowest bidders at the time of rejection.

(B) Performance and Payment Security: Performance and Payment Security must be provided in an amount and type specified in the PASSPort RFx. The performance and payment security shall be delivered by the contractor prior to or at the time of execution of the Contract. If a contractor fails to deliver the required performance and payment security, its bid security shall be enforced, and an award of Contract may be made to the next lowest responsible and responsive bidder, or the contract may be rebid.

(C) Acceptable Types of Security: Acceptable types of security for bids, performance, and payment shall be limited to the following:

(1) a one-time bond in a form satisfactory to the City;

(2) a bank certified check or money order;

(3) obligations of the City of New York; or

(4) other financial instruments as determined by the Office of Construction in consultation with the Comptroller.

Whenever the successful bidder deposits obligations of the City of New York as performance and payment security, the Comptroller may sell and use the proceeds thereof for any purpose for which the principal or

surety on such bond would be liable under the terms of the Contract. If the money is deposited with the Comptroller, the successful bidder shall not be entitled to receive interest on such money from the City.

(D) Form of Bonds: Security provided in the form of bonds must be prepared on the form of bonds authorized by the City of New York. Forms for bid, performance, and payment bonds are included in the Invitation for Bids Documents. Such bonds must have as surety thereunder such surety company or companies as are: (1) approved by the City of New York; (2) authorized to do business in the State of New York, and (3) approved by the Department of the Treasury of the United States. Premiums for any required bonds must be included in the base bid.

The bidder is advised that submission of a bid bond where the surety on such bond fails to meet the criteria set forth herein, shall result in the rejection of the bid as non-responsive.

The Department of the Treasury of the United States advises that information concerning approved surety companies may be obtained as follows: (1) from the Government Printing Office at 215-364-6465; (2) through the Internet at https://www.fiscal.treasury.gov/surety-bonds/.

(E) Power of Attorney: Attorneys in fact who sign bid, performance, or payment bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

27. Failure to Execute Contract

In the event of failure of the successful bidder to execute the Contract and furnish the required security within ten (10) days after notice of the award of the Contract, the deposit of the successful bidder or so much thereof as shall be applicable to the amount of the award made shall be retained by the City, and the successful bidder shall be liable for and hereby agrees to pay on demand the difference between the price bid and the price for which such Contract shall be subsequently awarded, including the cost of any required reletting and less the amount of such deposit. No plea of mistake in such accepted bid shall be available to the bidder for the recovery of the deposit or as a defense to any action based upon such accepted bid. Further, should the bidder's failure to comply with this Section cause any funding agency, body or group (Federal, State, City, Public, Private, etc.) to terminate, cancel or reduce the funding on this project, the bidder in such event shall be liable also to the City for the amount of actual funding withdrawn by such agency on this project, less the amount of the forfeited deposit.

28. Bidder Responsibilities and Qualifications

(A) Bidders must include with their bids all information necessary for a determination of bidder responsibility, as set forth in the Specifications.

(B) The Agency may require any bidder or prospective bidder to furnish all books of account, records, vouchers, statements or other information concerning the bidder's financial status for examination as may be required by the Agency to ascertain the bidder's responsibility and capability to perform the Contract. If required, a bidder must also submit a sworn statement setting forth such information as the Agency may require concerning present and proposed plant and equipment, the personnel and qualifications of the bidder's working organizations, prior experience and performance record.

(C) Oral Examination on Qualifications: In addition thereto, and when directed by the Agency, the bidder, or a responsible officer, agent or employee of the bidder, must submit to an oral examination to be conducted by the Agency in relation to the bidder's proposed tentative plan and schedule of operations, and such other matters as the Agency may deem necessary in order to determine the bidder's ability and responsibility to perform the work in accordance with the Contract. Each person so examined must sign and verify a stenographic transcript of such examination noting thereon such corrections as such person may desire to make.

(D) If the bidder fails or refuses to supply any of the documents or information set forth in paragraph (B) hereof or fails to comply with any of the requirements thereof, the Agency may reject the bid.

29. Employment Report

In accordance with Executive Order No. 50 (1980) as modified by Executive Order 108 (1986), the filing of a

completed Employment Report (ER) is a requirement of doing business with the City of New York for construction contractors with contracts of $1,000,000 or more and subcontractors with construction subcontracts of $750,000 or more. The required forms and information are included in the PASSPort Vendor Profile.

30. Labor Law Requirements

(A) General: The successful bidder will be required to comply strictly with all Federal, State and local labor laws and regulations.

(B) New York State Labor Law: This Contract is subject to New York State Labor Law Section 220, which requires that construction workers on the site be paid prevailing wages and supplements. The Contractor is reminded that all wage provisions of this Contract will be enforced strictly and failure to comply will be considered when evaluating performance. Noncompliance may result in the contractor being debarred by the City from future contracts. Complaints filed with the Comptroller may result in decisions which may debar a contractor from bidding contracts with any state governmental entity and other political subdivisions.

(C) Records: The Contractor is expected to submit accurate payroll reports and other required documents and verify attendance and job classifications being utilized in compliance with the law, Contract provisions and agency procedures.

31. Insurance

(A) Bidders are advised that the insurance requirements contained herein are regarded as material terms of the Contract. As required by Article 22 of the Contract, the contractor must effect and maintain with companies licensed and authorized to do business in the State of New York, the types of insurance set forth therein, when required by and in the amounts set forth in Schedule A of the General Conditions. Such required insurance must be provided from the date the contractor is ordered to commence work and up to the date of final acceptance of all required work.

(B) The contractor must, within ten days of receipt of the notice of award, submit the following insurance documentation: (a) original certificate of insurance for general liability in the amount required by Schedule A of the General Conditions, and (b) original certificates of insurance or other proof of coverage for workers' compensation and disability benefits, as required by Section 57 of the New York State Workers' Compensation Law and Section 220 of the Disability Benefits Law.

32. Lump Sum Contracts

(A) Comparison of Bids: Bids on Lump Sum Contracts will be compared on the basis of the lump sum price bid, adjusted for alternate prices bid, if any.

(B) Lump Sum Bids for "General Construction Work" which include excavation shall include all necessary excavation work defined in the Specifications as being included in the lump sum bid. The bidder shall also bid a unit price for the additional cost of excavating material which is defined in the Specifications as excavation for which additional payment will be made. The total estimated additional cost of removing such material will be taken as the quantity set forth in the Engineer's Estimate multiplied by the unit price bid. This total estimated cost of additional excavation shall be added to the lump sum bid for the General Construction Work for the purpose of comparing bids to determine the low bidder.

(C) Variations from Engineer's Estimate: The Engineer's Estimate of the quantity of excavation for which additional payment will be made is approximate only and is given solely to be used as a uniform basis for the comparison of bids and such estimate is not to be considered as part of this contract. The quantities actually required to complete the contract work may be more or less than the quantities in the Engineer's Estimate and, if so, no action for damages or for loss of profits shall accrue to the contractor by reason thereof.

33. Unit Price Contracts

(A) Comparison of Bids: Bids on Unit Price Contracts will be compared on the basis of a total estimated price,

arrived at by taking the sum of the estimated quantities of such items, in accordance with the Engineer's Estimate of Quantities set forth in the Bid Schedule, multiplied by the corresponding unit prices, and including any lump sum bids on individual items.

(B) Variations from Engineer's Estimate: Bidders are warned that the Engineer's Estimate of Quantities on the various items of work and materials is approximate only, given solely to be used as a uniform basis for the comparison of bids, and is not be considered part of this contract. The quantities actually required to complete the contract work may be less or more than so estimated, and if so, no action for damages or for loss of profits shall accrue to the contractor by reason thereof.

(C) Overruns: The terms and conditions applicable to overruns of unit price items are set forth in Article 26 of the Contract.

34. Excise Tax

Bidders are referred to the Specifications for information on Federal Excise Tax exemptions.

35. Licenses and Permits

The successful bidder will be required to obtain all necessary licenses and permits necessary to perform the work.

36. Multiple Prime Contractors

If more than one prime contractor will be involved on this project, all contractors are required to examine the Invitation for Bid packages for all other parts of the project.

37. Locally Based Enterprise Requirements (LBE)

This Contract is subject to the requirements of Administrative Code, Section 6-108.1, and the regulations promulgated thereunder. No construction contract will be awarded unless and until these requirements have been complied with in their entirety. The bidder is advised of the provisions set forth below, as well as the provisions with respect to the Locally Based Enterprise Program contained in Article 67 of the Contract. The contractor is advised that:

(A) If any portion of the Contract is subcontracted, not less than ten percent of the total dollar amount of the contract shall be awarded to locally based enterprises ("LBEs"); except, where less than ten percent of the total dollar amount of the Contract is subcontracted, such lesser percentage shall be so awarded.

(B) No contractor shall require performance and payment bonds from LBE subcontractors.

(C) No Contract shall be awarded unless the contractor first identifies in its bid:

(1) the percentage, dollar amount and type of work to be subcontracted; and

(2) the percentage, dollar amount and type of work to be subcontracted to LBEs.

(D) Within ten calendar days after notification of low bid, the apparent low bidder shall submit an "LBE Participation Schedule" to the contracting agency. If such schedule does not identify sufficient LBE subcontractors to meet the requirements of Administrative Code Section 6-108.1, the apparent low bidder shall submit documentation of its good faith efforts to meet such requirements.

(1) The "LBE Participation Schedule" shall include:

(a) the name and address of each LBE that will be given a subcontract,

(b) the percentage, dollar amount and type of work to be subcontracted to the LBE, and

(c) the dates when the LBE subcontract work will commence and end.

(2) The following documents shall be attached to the "LBE Participation Schedule":

(a) verification letters from each subcontractor listed in the "LBE Participation Schedule" stating that the LBE will enter into a formal agreement for work,

(b) certification documents of any proposed LBE subcontractor which is not on the LBE certified list, and

(c) copies of the certification letter of any proposed subcontractor which is an LBE.

(3) Documentation of good faith efforts to achieve the required LBE percentage shall include as appropriate but not limited to the following:

(a) attendance at prebid meetings, when scheduled by the agency, to advise bidders of contract requirements;

(b) advertisement where appropriate in general circulation media, trade association publications and small business media of the specific subcontracts that would be at least equal to the percentage goal for LBE utilization specified by the contractor;

(c) written notification to association of small, minority and women contractors soliciting specific subcontractors;

(d) written notification by certified mail to LBE firms that their interest in the contract is solicited for specific work items and their estimated values;

(e) demonstration of efforts made to select portions of the work for performance by LBE firms in order to increase the likelihood of achieving the stated goal;

(f) documented efforts to negotiate with LBE firms for specific subcontracts, including at a minimum:

(i) The names, address and telephone numbers of LBE firms that are contacted;

(ii) A description of the information provided to LBE firms regarding the plans and specifications for portions of the work to be performed;

(iii) Documentation showing that no reasonable price can be obtained from LBE firms;

(iv) A statement of why agreements with LBE firms were not reached;

(g) a statement of the reason for rejecting any LBE firm which the contractor deemed to be unqualified; and

(h) documentation of efforts made to assist the LBE firms contacted that needed assistance in obtaining required insurance.

(E) Unless otherwise waived by the Commissioner with the approval of the Office of Economic and Financial Opportunity, failure of a proposed contractor to provide the information required by paragraphs (C) and (D) above may render the bid non-responsive and the Contract may not be awarded to the bidder. If the contractor states that it will subcontract a specific portion of the work, but can demonstrate despite good faith efforts it cannot achieve its required LBE percentage for subcontracted work until after award of Contract, the Contract may be awarded, subject to a letter of compliance from the contractor stating that it will comply with Administrative Code Section 6-108.1 and subject to approval by the Commissioner. If the contractor has not met its required LBE percentage prior to award, the contractor shall demonstrate that a good faith effort has been made subsequent to award to obtain LBEs on each subcontract until its meets the required percentage.

(F) When a bidder indicates prior to award that no work will be subcontracted, no work may be subcontracted without the prior written approval of the Commissioner, which shall be granted only if the contractor in good faith seeks LBE subcontractors at least six weeks prior to the start of work.

(G) The contractor may not substitute or change any LBE which was identified prior to award of the contract without the written permission of the Commissioner. The contractor shall make a written application to the Commissioner for permission to make such substitution or change, explaining why the contractor needs to change its LBE subcontractor and how the contractor will meet its LBE subcontracting requirement. Copies of such application must be served on the originally identified LBE by certified mail return receipt requested,

as well as the proposed substitute LBE. The Commissioner shall determine whether or not to grant the contractor's request for substitution.

38. Bid Submission Requirements

The Bid Submission Requirements are set forth in the PASSPort RFx.

39. Comptroller's Certificate

This Contract shall not be binding or of any force unless it is registered by the Comptroller in accordance with Section 328 of the City Charter and the Procurement Policy Board Rules. This Contract shall continue in force only after annual appropriation of funds by the City of New York and certification as hereinabove set forth.

40. Procurement Policy Board Rules

This Invitation For Bids is subject to the Rules of the Procurement Policy Board of the City of New York. In the event of a conflict between said Rules and a provision of this Invitation For Bids, the Rules shall take precedence.

41. DDC Safety Requirements

The DDC Safety Requirements apply to the work to be performed pursuant to the Contract. The DDC Safety Requirements are set forth on the following pages.

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CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
SAFETY REQUIREMENTS FOR CONSTRUCTION CONTRACTS

January 2020

THE DDC SAFETY REQUIREMENTS FOR CONSTRUCTION CONTRACTS INCLUDE THE FOLLOWING SECTIONS:

I. POLICY ON SITE SAFETY

II. PURPOSE

III. DEFINITIONS

IV. RESPONSIBILITIES

V. SAFETY QUESTIONNAIRE

VI. SITE SAFETY PLAN

VII. KICK-OFF/PRE-CONSTRUCTION MEETINGS AND SAFETY REVIEW

VIII. EVALUATION DURING WORK IN PROGRESS

IX. SAFETY PERFORMANCE EVALUATION

I. POLICY ON SITE SAFETY

The City of New York Department of Design and Construction (DDC) is committed to a policy of injury and illness prevention and risk management for construction work that will ensure the safety and health of the workers engaged in the projects and the protection of the general public. Therefore, it is DDC's policy that work carried out by Contractors on DDC contracts must, at a minimum, comply with the most current versions of all applicable federal, state and city laws, rules, and regulations, including without limitation:

- Code of Federal Regulations, Title 29, Part 1926 (29 CFR 1926) and applicable Sub-parts of Part 1910 – U.S. Occupational Safety and Health Administration (OSHA);
- Federal Highway Administration – Manual on Uniform Traffic Control Devices (MUTCD);
- New York Codes, Rules and Regulations (NYCRR), Title 12, Part 23 – Protection in Construction, Demolition and Excavation Operations;
- New York Codes, Rules and Regulations (NYCRR), Title 16, Part 753 – Protection of Underground Facilities;
- New York City Administrative Code, Title 28 – New York City Construction Codes;
- Rules of the City of New York, Title 15, Chapter 13 – Rules Pertaining To the Prevention of the Emission of Dust from Construction Related Activities;
- Rules of the City of New York, Title 15, Chapter 28 – Citywide Construction Noise Mitigation;
- Rules of the City of New York, Title 34 Chapter 2 – NYCDOT Highway Rules.

The Contractor will be required to comply with all new and/or revised federal, state and city laws, rules, and regulations, issued during the course of the project, at the expense of the Contractor without any additional costs to the DDC.

II. PURPOSE

The purpose of this policy is to ensure that Contractors perform their work and supervise their employees in accordance with all applicable federal, state and city rules and regulations. Further, Contractors will be expected to minimize or eliminate jobsite and public hazards, through a planning, inspection, auditing and corrective action process. The goal is to control risks so that injuries, illnesses, and accidents to contractors' employees, DDC employees and the general public, as well as damage to city-owned and private property, are reduced to the lowest level feasible.

III. DEFINITIONS

Agency Chief Contracting Officer (ACCO): The ACCO will mean the person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the City Chief Procurement Officer (CCPO).

Competent Person: As defined by OSHA, an individual who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees or the general public, and who has authorization to take prompt corrective measures to eliminate them. This individual will have completed, at a minimum an authorized 30-hour OSHA Construction Safety Course. The Contractor may be required to provide more than one competent person due to construction operations and based on the number of active work sites.

Construction Safety Auditor: A representative of the Office of Construction Safety who provides inspection and assessment services to enhance health and safety on all DDC construction projects. The activities of the Construction Safety Auditor include performing site audits, reviewing safety plans, reviewing construction permits, drawings, verifying Contractor's compliance with applicable federal, state and city laws, rules, regulations, and DDC Contract Safety Requirements, etc. and rendering technical advice and assistance to DDC Resident Engineers and Project Managers.

Office of Construction Safety: A unit of DDC Safety and Site Support that assesses contractor's safety on DDC jobsites and advises responsible parties of needed corrective actions.

Registered Construction Superintendent: For certain projects, as defined in New York City Construction Codes – Title 28, the contractor will provide a Construction Superintendent registered with the NYC Department of Buildings and responsible for all duties as defined in Chapter 33 of Title 1 of the Rules of the City of New York.

Contractor: For purposes of these Safety Requirements, the term "Contractor" will mean any person or entity that enters into a contract for the performance of construction work on a DDC project. The term "Contractor" will include any person or entity which enters into any of the following types of contracts: (1) a prime construction contract for a specific project, (2) a prime construction contract using the Job Order Contracting System ("JOCS Contract"), and (3) a subcontract with a CM/Builder ("First Tier Subcontract").

Daily Safety Job Briefing: Daily jobsite safety briefings, given to all jobsite personnel at project site by the Contractor before work begins and/or if hazards or potential hazards are discovered while working, with the purpose of discussing the scheduled activities for the day, the hazards related to these activities, activity specific safety procedures, and Job Hazard Analysis associated with the scheduled construction work. Daily jobsite briefings will be documented, available at the jobsite, and will include at a minimum, topics, name and signature of the person conducting the briefing session, names and signatures of attendants, name of the designated competent person, contactor's name, DDC Project ID, date, time, and location.

Director – Office of Construction Safety: Responsible for the operations of the Office of Construction Safety and the DDC Site Safety management programs.

Job Hazard Analysis (JHA): A process of identifying the major job tasks and any potential site-specific hazards that may be present during construction and establishing the means and methods to eliminate or control those hazards. A JHA will be documented, available at the jobsite and will include at a minimum work tasks, being performed, identified hazards, control methods for the identified hazards, contractor's name, DDC Project ID, location, date, name and signature of certifying person. A JHA is a living document that will be re-evaluated and revised to address new hazards and tasks that may develop and will be present at the worksite and produced upon request.

Qualified Person: As defined by OSHA, an individual who, by possession of a recognized degree, certificate, license, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve problems relating to the subject matter, the work, or the project. Qualified Persons are required under regulation to address issues pertaining, but without limit, to fall protection, scaffold design, maintenance and protection of traffic, and excavation protective system, among others.

Project Site: Those areas indicated in the Contract Documents where the Work is to be performed.

Project Safety Representative: The designated Project Safety Representative will have at a minimum an OSHA 30-hour Construction Safety Course and other safety training applicable to Contractor's/subcontractor's project work. This individual will be responsible to oversee safety performance of the required construction work, conduct documented daily safety inspections, and implement corrective actions to maintain a safe work site. The Project Safety Representative must have sufficient experience and skills necessary to thoroughly understand the health and safety hazards and controls and must have authority to undertake corrective actions. A dedicated full-time Project Safety Representative may be required on large projects and projects deemed by DDC to be particularly high risk. DDC reserves the right to request a dedicated full-time Project Safety Representative for any reason at any time during the course of the project at the expense of the Contractor without any additional costs to the DDC. The full-time Project Safety Representative will be present at the site during all work activities.

Resident Engineer ("RE"): Representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the work. The RE may be a consultant retained by DDC, including a Construction Management (CM) or Resident Engineer Inspection (REI) firm. If DDC has retained a CM, REI or other consultant firm to perform management and oversite for the Project (e.g., CM-Builder, CM-Design-Builder, Project Manager, Program Manager), that CM, REI or other consultant is the Resident Engineer for purposes of these Safety Requirements.

Safety Questionnaire: Used by DDC to evaluate Contractor's current and past safety performance. It is required to be completed by all Contractors initially when submitting bids for Construction work, or when being pre-qualified

and updated annually or as requested by the DDC.

Site Safety Manager: For certain projects, as defined in New York City Construction Codes – Title 28, the Contractor will provide a Site Safety Manager with a Site Safety Manager License issued by the New York City Department of Building.

Site Safety Plan: A site-specific safety plan developed by the Contractor for a DDC project. The Site Safety Plan will identify the project work scope, identify hazards associated with the project work and include project specific safety procedures and training appropriate and necessary to complete the work. The Site Safety Plan will be submitted within 30 days from the Award Date or as otherwise directed and is subject to review and acceptance by the Office of Construction Safety prior to the commencement of work at the site.

Unsafe or Unhealthy Condition: A condition that could be potentially hazardous to the health and safety of personnel or the public, and/or damaging to equipment, machinery, property, or the environment.

Weekly Safety Meetings: Weekly jobsite safety meetings, given to all jobsite personnel by Contractor, with the purpose of discussing general safety topics and job specific requirements encountered at the DDC work site. Weekly safety meetings will be documented and will include at a minimum, topics, name and signature of the person conducting the meeting, names and signatures of attendees, contractor's name, DDC Project ID, date, and location.

Work: The construction required by the Contractor's Contract Documents whether completed or partially completed, performed by the Contractor/ subcontractors. Work refers to the furnishing of labor, furnishing and incorporating materials and equipment into the construction and providing any service required by the Contract Documents to fulfill the Contractor's obligation to complete the Project. For the purposes of these Safety Requirements, the term "Work" includes all Utility Interference work (commonly referred to as "Section U", "EP-7", and "Joint Bid" work) performed in association with this Contract.

IV. RESPONSIBILITIES

All persons who manage, perform, and provide support for construction projects will conduct operations in compliance with the requirements identified in this Policy and all applicable governing regulatory agency requirements and guidelines pertaining to safety in construction.

A. Resident Engineer

1. Review and facilitate Contractor(s) Site Safety Plan submittals to DDC for acceptability.
2. Notify the Office of Construction Safety of the commencement of construction work.
3. Develop and implement a training verification process to ensure that all CM/REI, consultant, Contractor, and subcontractor employees are properly trained. Maintain all applicable initial and refresher training records and assures documentation availability on site.
4. Maintain documentation of and attend weekly safety meetings and daily safety job briefings.
5. Assure that Contractor(s) JHA's are current to reflect the work tasks being performed, hazards, and control methods to mitigate the identified hazards. Verify that all employees at the job site are trained on the JHAs and maintain supporting documentation on site.
6. Assure adequate planning for all critical construction activities (crane operation, excavation, confined space entry, etc.) including coordination between Contractor(s) /DDC/ other Agencies as required.
7. Maintain custody of all construction related permits, plans, approvals, drawings, etc., related to the project and assure their availability on site.
8. Recognize, minimize, or eliminate jobsite and public hazards, through required planning, inspection, verification, and corrective action process.
9. Monitor the conditions at the site for conformance with the Contractor's Site Safety Plan, DDC policies, permits, and all applicable regulations and documentation that pertain to construction safety.
10. Notify the Contractor and DDC immediately upon determination of any condition or activity existing which is not in compliance with the Contractor's Site Safety Plan, applicable federal, state or local codes or any

condition that presents a potential risk of injury to the public or workers or possible damage to property. Direct the Contractor to provide such labor, materials, equipment, and supervision to remedy such conditions.

11. Notify the Office of Construction Safety and the ACCO's Insurance and Risk Management Unit of project-related accidents, incidents, and near misses as per DDC's Construction Safety Emergency and Accident Notification and Response Procedure within two (2) hours.
12. In case of an accident, incident, or near miss, RE is responsible to protect the integrity of the accident site including but not limited to: the safeguarding of all evidence, documentation of all personnel on site at the time of the accident, gather facts related to all accidents, incidents, or near miss, and prepare required DDC Construction Accident Report as per DDC's Construction Safety Emergency and Accident Notification and Response Procedure. Maintain all records pertaining to accidents, incidents, and near miss and have them available upon request.
13. Notify the Office of Construction Safety within two (2) hours of the start of an inspection by any outside/ regulatory agency personnel, including NYS, OSHA, NYC DOB or any other City/State/Federal oversight entity and forward a copy of the inspection report within one business day of its receipt.
14. Escort and assist Construction Safety Auditors during all field and record audits.
15. Report any emergency conditions to the Office of Construction Safety immediately.

Note: In addition to the responsibilities listed above, if the Resident Engineer is a CM/REI or other non-City party hired by the City to manage the Project, the Resident Engineer is also required to do the following:

16. Provide personnel who are certified and or trained appropriately for the requirements of the project.
17. Perform an investigation for any project-related accidents, incidents, and near misses. Within 24-hours of the time of the accident, incident, or near miss, the CM/REI will submit an investigation report to the Office of Construction Safety. Such report will include proposed remedial measures and implementation of corrective actions to prevent recurrence.

DDC reserves the right to request that the CM/REI replace any CM/REI personnel for any reason at any time during the project.

B. Construction Contractors

Note: For CM-Build and CM-Design-Build Projects, the CM will meet all requirements listed in this section, as well as the Resident Engineer section above.

1. Submit a completed Safety Questionnaire and other safety performance related documentation with its bid or as part of a pre-qualification package.
2. Submit a Site Safety Plan within 30 days from the Award Date or as otherwise directed. The Site Safety Plan is subject to review and acceptance by the Office of Construction Safety prior to the commencement of work at the site. The Site Safety Plan will be revised and updated as necessary during the course of the project. If requested by the Office of Construction Safety, the Site Safety Plan must be developed and submitted for approval using a web-based system, the Site Safety Plan Application (SSP App).
3. Designate and identify a Project Safety Representative in the Site Safety Plan. The Contractor will immediately notify the Office of Construction Safety, in a form and manner acceptable to the Office of Construction Safety, of any permanent change to the designated Project Safety Representative. In the event the primary designated Project Safety Representative is temporary unable to perform his or her duties, an alternate Project Safety Representative will be provided. Resumes, outlining the qualification and experience for the Project Safety Representative (s) will be included in the Site Safety Plan and available upon request. DDC reserves the right to request the Contractor to replace a Project Safety Representative for any reason at any time during the course of the project.
4. Designate and identify a Competent Person(s) in the Site Safety Plan. Contractor/subcontractor may be required to provide more than one competent person due to construction operations and based on a number of work tasks/areas. DDC reserves the right to request the Contractor to replace a Competent Person or provide additional Competent Person(s) for any reason at any time during the course of the project. The Competent Person will be present at the site during all work activities.
5. For certain projects, as defined in New York City Construction Codes – Title 28, designate and identify the Licensed Site Safety Manager or Registered Construction Superintendent. Resumes, outlining the qualification and experience for the Licensed Site Safety Manager or Registered Construction Superintendent will be included in the Site Safety Plan and available upon request. The Contractor will immediately notify the Office

of Construction Safety, in a form and manner acceptable to the Office of Construction Safety, of any permanent change to the designated Site Safety Manager and/or Construction Superintendent. In the event the primary designated Site Safety Manager or Construction Superintendent is temporarily unable to perform his or her duties, an alternate Licensed Site Safety Manager and/or Registered Construction Superintendent will be provided. The Office of Construction Safety must be informed of such change. DDC reserves the right to request the Contractor to replace Site Safety Manager or Construction Superintendent for any reason at any time during the course of the project.

6. Develop a written Job Hazard Analysis (JHA) that identifies safety hazards and control methods for project specific work tasks. A preliminary JHA will be included in the Site Safety Plan submitted by the Contractor. A JHA is a living document that will be re-evaluated and revised to address new hazards and tasks that may develop during the course of the project and will be present at the worksite and produced upon request.
7. Develop project specific safety procedures to protect employees, general public, and property during all construction activities for the duration of the project.
8. Ensure that all employees are aware of the hazards associated with the project through documented formal and informal training and/or other communications. Conduct and document new employee and site-specific safety orientation for all Contractor and subcontractor personnel to review the hazards associated with the project as identified in the Site Safety Plan and the specific safety procedures and controls that will be used to protect workers, the general public and property. The Project Safety Representative will conduct this training prior to mobilization and if necessary during the course of the project. Documentation will be provided to the RE.
9. Prior to performing any work on DDC projects all Contractor's and subcontractor's employees will, at a minimum, have successfully completed, within the previous five calendar years, an OSHA 10-hour construction safety course.

   All training records (OSHA 10-hour, flagger, scaffold, fall protection, confined space, etc.) will be provided to the RE prior to mobilization, included in the Site Safety Plan, kept current during the course of the project, and available for review.
10. Conduct and document weekly safety meetings and daily job briefing sessions for the duration of the project. Attendance at weekly safety meetings and daily job briefing sessions is mandatory. A written record of weekly safety meetings will be available upon request and job briefing sessions will be available at the worksite.
11. As part of the Site Safety Plan, prepare site specific procedures, such as maintenance and protection of traffic plan, steel erection plan, confined space program, fall protection plan, demolition plan, site specific emergency evacuation plan, etc. (if not otherwise provided in the contract documents) and comply with all of its provisions.
12. Have immediately available for review at the project site where actual construction activities are being performed all applicable documentation, including but not limited to: JHAs for work tasks being performed, all required training records, MPT plan (where applicable), Noise and Dust Mitigation Plans, excavation protective system drawings (where applicable), Emergency Evacuation plan, fall protection program (where applicable), confined space program (where applicable), all required permits, daily job briefing records, all required documentation for crane operation (where applicable), daily inspection checklist, scaffold and sidewalk drawings (when applicable), safety data sheets for chemicals in use.
13. Comply with all federal, state and local safety and health rules, laws, and regulations.
14. Comply with all provisions of the Site Safety Plan.
15. Provide, replace, and adequately maintain at or around the project site, suitable and sufficient signage, lights, barricades and enclosures (fences, sidewalk sheds, netting, bracing, etc.). The project specific MPT plan will be developed, implemented, and reviewed during the course of the project.
16. The Project Safety Representative will conduct daily safety inspections, document the inspection results, implement corrective actions for the identified hazards. Maintain the inspection records and have them available upon request.
17. **Report unsafe or unhealthy conditions to the RE as soon as practical, but no more than 24 hours after discovery, and take prompt actions to remove or abate such conditions. Should an imminent dangerous condition be discovered, Contractor will stop all work in the area of danger until corrections are made.**
18. Report all accidents, incidents and near misses involving injuries to workers or the general public, as well as property damage, to the RE within one (1) hour.
19. Following an accident or incident, unless otherwise directed, the Contractor will not remove or alter any equipment, structure, material, or evidence related to the accident or incident. Exception: Immediate emergency procedures taken to secure structures, temporary construction, operations, or equipment that pose a continued imminent danger or facilitate assistance for persons who are trapped or who have sustained bodily injury. Take

additional measures as necessary to secure the accident or incident site and to protect against any further injury or property damage.

20. The Contractor will perform an investigation into the root cause of the accident, incident, or near miss. Within 24 hours of an accident, incident, or near miss, the Contractor will prepare and submit to the RE a written investigation report detailing findings, corrective actions, and hazard mitigation implementation to prevent recurrence.
21. Notify the RE within two (2) hours of the start of an inspection by any outside regulatory agency personnel, including OSHA, NYC DOB, or others.
22. Maintain all records pertaining to all required safety compliance documents, accidents and incidents reports. DDC reserves the right to request copy of any records pertaining to the safety of the project and required by DDC and other federal, state, and city agencies, including but not limited to permits, training records, safety inspection records, drawings, equipment records, etc.
23. Cooperate with DDC Office of Construction Safety/ RE and address DDC recommendations on safety, which will in no way relieve the Contractor of its responsibilities for safety on the project. The Contractor has sole responsibility for safety.

V. SAFETY QUESTIONNAIRE

DDC requires that all Contractors provide information regarding their current and past safety performance and programs. This will be accomplished by the use of the DDC Safety Questionnaire. As a part of the bid submittal package, the contractor will submit a completed DDC Safety Questionnaire listing company workers' compensation experience modification rating and OSHA Incident Rates for the three (3) years prior to the date of the bid opening. DDC may request a Contractor to update its Questionnaire at any time or to provide more detailed information. The Contractor will provide the requested information within 15 days.

The following criteria will be used by DDC in reviewing the Contractor's responsibility, which will be based on the information provided on the questionnaire:

Criteria 1: OSHA Injury and Illness Rates (I&IR) are no greater than the average for the industry (based on the most current Bureau of Labor Statistics data for the Contractors SIC code); and

Criteria 2: Insurance workers compensation Experience Modification Rate (EMR) equal to or less than 1.0; and

Criteria 3: Any willful violations issued by OSHA or NYC DOB within the last three (3) years; and

Criteria 4: A fatality (worker or member of public) and injuries, requiring OSHA notification, experienced on or near Contractor's worksite within the last three (3) years; and

Criteria 5: Past safety performance on DDC projects (accidents; status of site safety plan submittals; etc.)

Criteria 6: OSHA violation history for the last three (3) years;

Criteria 7: Contractor will provide OSHA Injury and Illness Records (currently OSHA 300 and 300A Logs) for the last three (3) years.

If the Contractor fails to meet the basic criteria listed above, the Office of Construction Safety may request, through the ACCO, more details concerning the Contractor's safety experience. DDC may request the Contractor to provide copies of, among other things, accident investigation reports, OSHA records, OSHA and NYC DOB citations, EPA citations and written corrective action plan.

VI. SITE SAFETY PLAN

Within thirty (30) days from the Award Date or as otherwise directed, the Contractor will submit the Site Safety Plan. The Site Safety Plan will identify project work scope, safety hazards associated with the project tasks, and include specific safety procedures and training appropriate and necessary to complete the work. The Site Safety Plan is subject to review and acceptance by the Office of Construction Safety prior to the commencement of work at the site. Due to the project work scope and project duration, the Office of Construction Safety may grant a conditional acceptance for a Site Safety Plan without all sections being complete. In a case of a "Conditional Acceptance" of a Site Safety Plan,

the Contractor will provide the remaining sections previously incomplete and/or not submitted for review and acceptance by the Office of Construction Safety prior to the commencement of the construction activities. The Office of Construction Safety reserves the right to withdraw the initial "Conditional Acceptance" if the Contractor fails to provide the remaining sections of a Site Safety Plan. Failure by the Contractor to submit an acceptable Site Safety Plan will be grounds for default.

Site Safety Plan requirements: The Site Safety Plan will be a written document and will apply to all project specific Contractor and subcontractor operations, and will have at a minimum, the following elements with each described in a separate section (It may be necessary to modify the basic format for certain unique or high-risk projects, such as tunnels or high-rise construction). All Site Safety Plan sections will be numbered in the order listed below. For sections, which are not applicable for the type of the work being performed by the Contractor on DDC project, the Contractor will in writing indicate "Not applicable based on the project work scope." The Site Safety Plan will include Contractor's name, DDC project ID, project location (s), and development and revision dates. The Site Safety Plan will include the sections, attachments, and appendixes provided in the Site Safety Plan. All pages of the Site Safety Plan will be numbered. If requested by the Office of Construction Safety, the Site Safety Plan must be developed and submitted for approval using a web-based system, the Site Safety Plan Application (SSP App).

1. Project Work Scope – Detailed information regarding work tasks that will be performed by Contractor and subcontractors under the project.
2. Responsibility and Organization – Contractor's organization chart with responsible personnel for the project, including titles, names, contact information, roles, and responsibilities. All Contractor's personnel required by the DDC Safety Requirements will be identified.
3. Safety Training and Education – OSHA 10 Hours training, requirements for daily safety briefings and weekly safety meetings, any work task specific training, responsible staff for implementation of training program for the project.
4. Job Hazard Analysis (JHA) – Project specific Job Hazard Analysis including work tasks, identified hazards, hazard control methods (administrative, engineering, PPE) to protect workers, property and general public, Contractor's name, project id, location, name and signature of a certifying person, hazard assessment date.
5. Protection of Public – Project specific procedures covering safety of the general public during all project construction activities.
6. Hazard Corrective Actions - Procedures for hazard identification, including responsible person(s), frequency of safety inspections, implementation of corrective actions, safety inspection checklist.
7. Accident/Exposure Investigation – Project specific procedures for accident/incident/near miss investigation and implementation of corrective actions. Accident/incident/near miss notification procedure of DDC project staff (timer frame and responsible personnel).
8. Recording and Reporting Injuries – Procedures to meet 29 CFR 1904 requirements.
9. First Aid and Medical Attention – Responsible staff, location and inspection of First Aid kit, directions to local hospitals; emergency telephone numbers.
10. Project Specific Fire Protection and Prevention Program – Project specific procedures, including responsible staff, fire alarm system/methods, hot work procedures, etc.
11. Housekeeping Procedure.
12. Project Specific Illumination Procedure.
13. Project Specific Sanitation Procedure.
14. Personal Protective Equipment (PPE), including Respiratory Protection Program and Hearing Conservation Program, if required.
15. Hazard Communication Program – Contractor's Hazard Communication Program, responsible staff; training; SDS records, project specific list of chemicals; location of the program and SDS records.
16. Means of Egress – Information regarding free and unobstructed egress from all parts of the building or structure; exit marking; maintenance of means of egress, etc.
17. Employee Emergency Action Plan – Project specific: responsible staff, emergency alarm system/devices, evacuation procedure, procedure to account for employees after evacuation, etc.
18. Evacuation Plan – Project specific evacuation plan (drawing/scheme) with exists and evacuation routes.
19. Ionizing/Nonionizing Radiation – Competent person, license and qualification requirements, type of radiation, employee's exposure and protection, safety procedures, etc.

20. Material Handling, Storage, Use and Disposal – Project specific information regarding material storage, disposal, and handling: procedures, plan/drawings, etc.
21. Signs, Signals, and Barricades – Use of danger/warning signs, safety instruction signs, sidewalk closure and pedestrian fencing and barricades (if not included in the MPT plan), etc.
22. Tools – Hand and Power – Safety procedures for the type of tools to be used.
23. Scaffold – Project specific scaffold types, procedures, training requirements, scaffold drawings, designed, sealed, and signed by NYS Licensed Professional Engineer, or as otherwise directed; competent person, criteria for project specific scaffold, falling object protection, procedures for aerial lifts/scissor lifts.
24. Welding and Cutting – Project specific procedure for welding and cutting, including all necessary safety requirements such as fire prevention, personal protective equipment, hot work permits (if not covered by Contractor's Fire Prevention and Protection program, FDNY certificate requirements).
25. Electrical Safety – Project specific procedures, including lock out-tag out.
26. Fall Protection – Project specific information regarding selected fall protection systems, fall protection plan, responsible staff.
27. Cranes, Derrick, Hoists, Elevators, Conveyors – project specific equipment information including type, rated load capacity, manufacture specification requirements, competent person, exposure to falling load, inspection, recordkeeping, clearance requirements, communication procedure, ground lines, permits.
28. Excavation Safety – Competent person; excavation procedures; project specific protective system, including drawings, designed, sealed, and signed by NYS Licensed Professional Engineer, or as otherwise directed.
29. Protection of Underground Facilities and Utilities Procedure, including responsible staff and responsibilities.
30. Concrete and Masonry Construction Procedures
31. Maintenance and Protection of Traffic Plan – Project specific MPT plan, designed, sealed, and signed by NYS Licensed Professional Engineer, or as otherwise directed; flagmen training, public safety, etc.
32. Steel Erection – Site specific erection plan, requirements for applicable written notifications, competent person, fall protection plan, training requirements, etc.
33. Demolition – Engineering survey, including written evidence, disconnection of all effected utilities, identification of all hazardous chemicals, materials, gases, etc., floor openings, chutes, inspection and maintenance of all stairs/passageways, removal of materials/debris/structural elements, lock out/tag out, competent person.
34. Blasting and the Use of Explosives – Project specific safety procedures, warning signs, training/qualification, transportation, storage and use of explosives, inspection.
35. Stairways and Ladders – Types of stairs and ladders, safety procedures, training requirements.
36. Alcohol and Drug Abuse Policy
37. Rodents and Vermin Controls
38. Toxic and Hazardous Substances – Safety procedures for substances that Contractor's and subcontractor's employees can be exposed on project.
39. Noise Mitigation Plan – Completed project specific Noise Mitigation Plan, and noise mitigation procedures.
40. Confined Space Program – Project specific Confined Space Program, responsible staff, training records, equipment information, rescue procedure, list of project specific confined spaces, forms.
41. Construction Vehicles/Heavy Equipment – Type of construction vehicles/heavy equipment to be used on site, procedures
42. Dust Mitigation Plan – Completed project specific Dust Mitigation Plan, and dust mitigation procedures.
43. Working Over and Near Water. Diving Operations – safety procedures including personal protective equipment, fall protection, rescue services, etc.

The most critical component of the Site Safety Plan is the Job Hazard Analysis (JHA) section. The JHA form is a written document prepared by the Contractor. The Contractor will conduct a site and task assessment to identify the tasks and any potential safety or environmental hazards related to performance of the work, eliminate or implement controls for the potential hazards, and identify proper personal protective equipment for the task. The JHA will be communicated to all Contractor/subcontractor personnel on site. The JHA will include safety hazard identification and controls to protect employees, general public, and property.

The initial JHA will be included in the Contractor's Site Safety Plan and the current JHA form will be available at the construction site for reference. A JHA is a living document that will be re-evaluated and revised to address new hazards and tasks that may develop and will be present at the worksite and produced upon request.

VII. KICK-OFF MEETINGS/PRE-CONSTRUCTION AND SAFETY REVIEW

Prior to the start of construction activities on all DDC projects, RE will invite the Office of Construction Safety to the construction kick-off meeting. The Office of Construction Safety representative(s) will participate in this meeting with the Contractor and RE for the purpose of:

A. Reviewing DDC Contract Safety Requirements
B. Reviewing site-specific safety issues based on a project work scope, location, and any other factors which may impact safety of workers and general public.
C. Reviewing the Site Safety Plan and JHA requirements.
D. Reviewing Accident/Incident reporting and investigation procedures.
E. Reviewing designated safety contacts, roles, and responsibilities.
F. Discussing planned inspections and audits of the site by the Office of Construction Safety personnel.

VIII. EVALUATION DURING WORK IN PROGRESS

The Contractor's adherence to these Safety Requirements will be monitored throughout the project. This will be accomplished by the following:

A. Use of a safety checklist by a representative of the Office of Construction Safety (or other designated DDC representative) and the RE during regular inspections and comprehensive audits of the job site. Field Exit Conferences will be held with the RE and Contractor Project Safety Representatives.
B. The RE will continually monitor the safety and environmental performance of the Contractor's employees and work methods. Deficiencies will be brought to the attention of the Contractor's Project Safety Representative on site for immediate correction. The RE will maintain a written record of these deficiencies and have these records available upon request. Any critical deficiencies will be immediately reported to the Office of Construction Safety via telephone (718)391-1911.
C. If the Contractor's safety performance during the project is not up to DDC standards (safety performance measure, accident/incident rate, etc.) the Director – Office of Construction Safety, or his/her designee will meet with the Contractor's Project Safety Representative and other representatives, the RE, and the DDC Environmental Specialist (if environmental issues are involved). The purpose of this meeting is to 1) determine the level of non-compliance; 2) explain and clarify the safety/environmental provisions; 3) agree on a future course of action to correct the deficiencies.
D. If the deficiencies continue, the Commissioner may, without limitation, declare the Contractor in default.
E. The Contractor will within 1 hour inform the RE of all accidents/incidents/near misses including all fatalities, any injuries to employees or members of the general public, and property damage (e.g., structural damage, equipment rollovers, utility damage, loads dropped from crane). The RE will notify the Office of Construction Safety as per DDC's Construction Safety Emergency and Accident Notification and Response Procedure and will maintain a record of all Contractor accidents/incidents for the project.
F. The Contractor and the RE will notify the Office of Construction Safety within two (2) hours of the start of any NYS-DOL/ NYC-COSH/ OSHA/ EPA inspections.

IX. SAFETY PERFORMANCE EVALUATION

The Contractor's safety record, including accident/incident history and DDC safety inspection results, will be considered as part of the Contractor's performance evaluation at the conclusion of the project. Poor safety performance during the course of the project will be a reason to rate a Contractor unsatisfactory which may be reflected in the City's PASSPort system and will be considered for future procurement actions as set forth in the City's Procurement Policy Board Rules.

NOTICE TO BIDDERS

Please be advised that the following Riders to the March 2017 New York City Standard Construction Contract have been attached and incorporated in this Invitation for Bid:

- Rider regarding Non-Compensable Delays and Grounds for Extension;
- Rider regarding NYC Earned Safe and Sick Time Act;
- Rider regarding City Fleet and Truck Safety Requirements for City Contractors.

Other than provisions specifically delineated in the Riders, all other terms of the March 2017 New York City Standard Construction Contract continue to apply in full force and effect.

RIDER TO NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (MARCH 2017) REGARDING NON-COMPENSABLE DELAYS AND GROUNDS FOR EXTENSION

The following provisions supersede the corresponding provisions in the March 2017 version of the New York City Standard Construction Contract:

1. Section **11.5.1** provides as follows:

   11.5.1 The acts or omissions of public or government bodies (other than **City** agencies) or of any third parties who are disclosed in the **Contract Documents,** or those third parties who are ordinarily encountered or who are generally recognized as related to the **Work**, including but not limited to, **Other Contractors**, utilities or private enterprises;

2. Section **11.5.6** provides as follows:

   11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God; acts of war or of the public enemy or terrorist acts; disruption, outage or power failure caused by a utility's inability or failure to provide service, pandemics, epidemics, outbreaks of infectious disease or any other public health emergency; other states of emergency declared by the City, State or Federal government , quarantine restrictions, and freight embargoes; including the **City's** reasonable responses to any of the above; and

3. Section **13.3** provides as follows:

   13.3 Grounds for Extension: If such application is made, the **Contractor** shall be entitled to an extension of time for delay in completion of the **Work** caused solely:

   13.3.1 By any of the acts or omissions of the **City**, its officials, agents or employees set forth in Articles **11.4.1.1** through **11.4.1.9**; or

   13.3.2 By or attributable to any of the items set forth in Articles **11.5.1** through **11.5.7**.

   13.3.3 The **Contractor** shall, however, be entitled to an extension of time for such causes only for the number of **Days** of delay which the **ACCO** or the Board may determine to be due solely to such causes, and then only if the **Contractor** shall have strictly complied with all of the requirements of Articles 9 and 10.

NYC EARNED SAFE AND SICK TIME ACT CONTRACT RIDER

(To supersede Section 4.06 of the January 2018 Appendix A and Section 35.5 of the March 2017 Standard Construction Contract and to be attached to other City contracts and solicitations)

A. *Introduction and General Provisions.*

1. The Earned Safe and Sick Time Act ("ESSTA"), codified at Title 20, Chapter 8 of the New York City Administrative Code, also known as the "Paid Safe and Sick Leave Law," requires covered employees (as defined in Admin. Code § 20-912) in New York City ("City") to be provided with paid safe and sick time. Contractors of the City or of other governmental entities may be required to provide safe and sick time pursuant to the ESSTA. The ESSTA is enforced by the City's Department of Consumer and Worker Protection ("DCWP"), which has promulgated 6 RCNY §§ 7-101 and 201 *et seq*. ("DCWP Rules").

2. The Contractor agrees to comply in all respects with the ESSTA and the DCWP Rules, and as amended, if applicable, in the performance of this agreement. The Contractor further acknowledges that such compliance is a material term of this agreement and that failure to comply with the ESSTA in performance of this agreement may result in its termination.

3. The Contractor must notify (with a copy to DCWP at ComplianceMonitoring@dcwp.nyc.gov) the Agency Chief Contracting Officer of the City Agency or other entity with whom it is contracting in writing within 10 days of receipt of a complaint (whether oral or written) or notice of investigation regarding the ESSTA involving the performance of this agreement. Additionally, the Contractor must cooperate with DCWP's guidance and must comply with DCWP's subpoenas, requests for information, and other document demands as set forth in the ESSTA and the DCWP Rules. More information is available at https://www1.nyc.gov/site/dca/about/paid-sick-leave-what-employers-need-to-know.page.

4. Upon conclusion of a DCWP investigation, Contractor will receive a findings letter detailing any employee relief and civil penalties owed. Pursuant to the findings, Contractor will have the opportunity to settle any violations and cure the breach of this agreement caused by failure to comply with the ESSTA either i) without a trial by entering into a consent order or ii) appearing before an impartial judge at the City's administrative tribunal. In addition to and notwithstanding any other rights and remedies available to the City, non-payment of relief and penalties owed pursuant to a consent order or final adjudication within 30 days of such consent order or final adjudication may result in the termination of this agreement without further opportunity to settle or cure the violations.

5. The ESSTA is briefly summarized below for the convenience of the Contractor. The Contractor is advised to review the ESSTA and the DCWP Rules in their entirety. The Contractor may go to www.nyc.gov/PaidSickLeave for resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which the Contractor can get more information about how to comply with the ESSTA and the DCWP Rules. The Contractor acknowledges that it is responsible for compliance with the ESSTA and the DCWP Rules notwithstanding any inconsistent language contained herein.

B. *Pursuant to the ESSTA and DCWP Rules: Applicability, Accrual, and Use.*

1. An employee who works within the City must be provided paid safe and sick time.[1] Employers with one hundred or more employees are required to provide 56 hours of safe and sick time for an employee each calendar year. Employers with fewer than one hundred employees are required to provide 40 hours of sick leave each calendar year. Employers must provide a minimum of one hour of safe and sick time for every 30 hours worked by an employee and compensation for such safe and sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage at the time the paid safe or sick time is taken. Employers are not discouraged or prohibited from providing more generous safe and sick time policies than what the ESSTA requires.

2. Employees have the right to determine how much safe and sick time they will use, provided that an employer may set a reasonable minimum increment for the use of safe and sick time not to exceed four hours per day. For the use of safe time or sick time beyond the set minimum increment, an employer may set fixed periods of up to thirty minutes beyond the minimum increment. In addition, an employee may carry over up to 40 or 56 hours of unused safe and sick time to the following calendar year, provided that no employer is required to carry over unused paid safe and sick time if the employee is paid for such unused safe and sick time and the employer provides the employee with at least the legally required amount of paid safe and sick time for such employee for the immediately subsequent calendar year on the first day of such calendar year.

3. An employee entitled to safe and sick time pursuant to the ESSTA may use safe and sick time for any of the following:

a. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;

b. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild, or grandparent, the child or parent of an employee's spouse or domestic partner, any other individual related by blood to the employee, and any other individual whose close association with the employee is the equivalent of a family relationship) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;

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[1] Pursuant to the ESSTA, if fewer than five employees work for the same employer, and the employer had a net income of less than one million dollars during the previous tax year, such employer has the option of providing such employees uncompensated safe and sick time.

c. closure of such employee's place of business by order of a public official due to a public health emergency;

d. such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency; or

e. when the employee or a family member has been the victim of a family offense matter, sexual offense, stalking, or human trafficking:

1. to obtain services from a domestic violence shelter, rape crisis center, or other shelter or services program for relief from a family offense matter, sexual offense, stalking, or human trafficking;
2. to participate in safety planning, temporarily or permanently relocate, or take other actions to increase the safety of the employee or employee's family members from future family offense matters, sexual offenses, stalking, or human trafficking;
3. to meet with a civil attorney or other social service provider to obtain information and advice on, and prepare for or participate in any criminal or civil proceeding, including but not limited to, matters related to a family offense matter, sexual offense, stalking, human trafficking, custody, visitation, matrimonial issues, orders of protection, immigration, housing, discrimination in employment, housing or consumer credit;
4. to file a complaint or domestic incident report with law enforcement;
5. to meet with a district attorney's office;
6. to enroll children in a new school; or
7. to take other actions necessary to maintain, improve, or restore the physical, psychological, or economic, health or safety of the employee or the employee's family member or to protect those who associate or work with the employee.

4. An employer must not require an employee, as a condition of taking safe and sick time, to search for a replacement. However, where the employee's need for safe and sick time is foreseeable, an employer may require an employee to provide reasonable notice of the need to use safe and sick time. For an absence of more than three consecutive work days, an employer may require reasonable documentation that the use of safe and sick time was needed for a reason listed in Admin. Code § 20-914; and/or written confirmation that an employee used safe and sick time pursuant to the ESSTA. However, an employer may not require documentation specifying the nature of a medical condition, require disclosure of the details of a medical condition, or require disclosure of the details of a family offense matter, sexual offense, stalking, or human trafficking, as a condition of providing safe and sick time. Health information and information concerning family offenses, sexual offenses, stalking or human trafficking obtained solely due to an

employee's use of safe and sick time pursuant to the ESSTA must be treated by the employer as confidential. An employer must reimburse an employee for all reasonable costs or expenses incurred in obtaining such documentation for the employer.

5. An employer must provide to all employees a written policy explaining its method of calculating sick time, policies regarding the use of safe and sick time (including any permissible discretionary conditions on use), and policies regarding carry-over of unused time at the end of the year, among other topics. It must provide the policy to employees using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny safe and sick time to an employee because of non-compliance with such a policy.

6. An employer must provide a pay statement or other form of written documentation that informs the employee of the amount of safe/sick time accrued and used during the relevant pay period and the total balance of the employee's accrued safe/sick time available for use.

7. Safe and sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the safe and sick time was used.

C. *Exemptions and Exceptions*. Notwithstanding the above, the ESSTA does not apply to any of the following:

1. an independent contractor who does not meet the definition of employee under N.Y. Labor Law § 190(2);

2. an employee covered by a valid collective bargaining agreement, if the provisions of the ESSTA are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the ESSTA for such employee;

3. an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines their own schedule, has the ability to reject or accept any assignment referred to them, and is paid an average hourly wage that is at least four times the federal minimum wage;

4. an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

5. an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

6. a participant in a Work Experience Program (WEP) under N.Y. Social Services Law § 336-c.

D. *Retaliation Prohibited.* An employer shall not take any adverse action against an employee that penalizes the employee for, or is reasonably likely to deter the employee from or interfere with the employee exercising or attempting in good faith to exercise any right provided by the ESSTA. In addition, an employer shall not interfere with any investigation, proceeding, or hearing pursuant to the ESSTA.

E. *Notice of Rights.*

1. An employer must provide its employees with written notice of their rights pursuant to the ESSTA. Such notice must be in English and the primary language spoken by an employee, provided that DCWP has made available a translation into such language. Downloadable notices are available on DCWP's website at https://www1.nyc.gov/site/dca/about/Paid-Safe-Sick-Leave-Notice-of-Employee-Rights.page. The notice must be provided to the employees by a method that reasonably ensures personal receipt by the employee.

2. Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed $50.00 for each employee who was not given appropriate notice.

F. *Records*. An employer must retain records documenting its compliance with the ESSTA for a period of at least three years, and must allow DCWP to access such records in furtherance of an investigation related to an alleged violation of the ESSTA.

G. *Enforcement and Penalties.*

1. Upon receiving a complaint alleging a violation of the ESSTA, DCWP must investigate such complaint. DCWP may also open an investigation to determine compliance with the ESSTA on its own initiative. Upon notification of a complaint or an investigation by DCWP, the employer must provide DCWP with a written response and any such other information as DCWP may request. If DCWP believes that a violation of the ESSTA has occurred, it has the right to issue a notice of violation to the employer .

2. DCWP has the power to grant an employee or former employee all appropriate relief as set forth in Admin. Code § 20-924(d). Such relief may include, but is not limited to, treble damages for the wages that should have been paid; statutory damages for unlawful retaliation; and damages, including statutory damages, full compensation for wages and benefits lost, and reinstatement, for unlawful discharge. In addition, DCWP may impose on an employer found to have violated the ESSTA civil penalties not to exceed $500.00 for a first violation, $750.00 for a second violation within two years of the first violation, and $1,000.00 for each succeeding violation within two years of the previous violation. When an employer has a policy or practice of not providing or refusing to allow the use of safe and sick time to its employees, DCWP may seek penalties and relief on a per employee basis.

3. Pursuant to Admin. Code § 20-924.2, (a) where reasonable cause exists to believe that an employer is engaged in a pattern or practice of violations of the ESSTA, the Corporation Counsel may commence a civil action on behalf of the City in a court of competent jurisdiction by filing a complaint setting forth facts relating to such pattern or practice and requesting relief, which may include injunctive relief, civil penalties and any other appropriate relief. Nothing in § 20-924.2 prohibits DCWP from exercising its authority under section 20-924 or the Charter, provided that a civil action pursuant to § 20-924.2 shall not have previously been commenced.

H. *More Generous Polices and Other Legal Requirements.* Nothing in the ESSTA is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous safe and sick time policy, or the obligation of an employer to comply with any contract, collective bargaining agreement, employment benefit plan or other agreement providing more generous safe and sick time. The ESSTA provides minimum requirements pertaining to safe and sick time and does not preempt, limit, or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of safe and sick leave or time, whether paid or unpaid, or that extends other protections to employees. The ESSTA may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

New York City Mayoral Executive Order No. 39 Rider

City Fleet and Truck Safety Requirements for City Contractors

Version: 11/19/24

[Instruction to Agencies: Please attach this Rider to the following agreements: (1) Procurement Contracts that meet the criteria set forth in Executive Order 39 of February 1, 2024; and (2) to the March 2017 version of the New York City Standard Construction Contract.]

Section 1.01 Background

This rider is included in the Agreement and made a part thereof pursuant to the provisions of Mayoral Executive Order 39 of 2024.

Section 1.02 Definitions

A. Capitalized terms not otherwise defined in this rider shall have the meaning ascribed to them in the Agreement.

B. Agreement: The agreement between the City and the Contractor, to which this rider has been added and made a part.

C. City-contracted Vehicle means a Truck (as hereinafter defined) or any other motor vehicle that the Contractor anticipates providing in accordance with this Agreement or using in performing its obligations under this Agreement on a weekly or more frequent basis[1]. This includes those vehicles anticipated to be provided or used by subcontractors to fulfill the scope of a subcontract for work to be performed under a contract that is subject to the Executive Order, regardless of monetary value of the subcontract, if the vehicle is utilized on a weekly or more frequent basis.

D. Contracting Agency: the City agency or office through which the City of New York has entered into this Agreement.

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[1] The following vehicles are not considered City-contracted vehicles and are thus not subject to Executive Order 39: any motor vehicle or truck that is utilized pursuant to (1) contracts registered prior to July 1, 2024, including the renewal, extension, or modification of such contracts; (2) an agency on-call emergency contract; (3) an emergency procurement made pursuant to section 3-06 of title 9 of the Rules of the City of New York or pursuant to an executive order of the Mayor or Governor issued under section 24 or section 29-A of the New York State Executive Law; (4) intergovernmental contracts; (5) government-to-government contracts between the City and any State or Federal government agency; and (6) a contract for utilities, as identified in subdivision (b) of section 825 of the New York City Charter.

E. Contractor: the entity providing services under this Agreement.

F. Executive Order: Mayoral Executive Order 39 of 2024, as it may be amended.

G. High Vision Truck: A Truck with a cab-over or cab-forward design wherein the driver sits in front of the front axle as opposed to conventional cab design wherein the engine and front axle are in front of the driver. The distance from the forward of the center of the vehicle bumper at which the driver can see the top of a 3-foot cone shall not exceed eight feet and the distance beyond the exterior of the passenger side door at which the driver can first see the top of the 4-foot cone shall not exceed six feet.

H. Registration: Registration of this Agreement pursuant to Section 328 of the New York City Charter.

I. Telematics: Automatic vehicle location systems that track vehicle location and speed and alert the driver and another designated person(s) to such location and speed in real time.

J. Truck: A City-contracted Vehicle with a manufacturer's gross vehicle weight rating exceeding 10,000 pounds. The term does not include off-road construction vehicles.

K. Truck Surround Cameras: A system of cameras, sensors, and alerts placed on a Truck that provides a Truck operator with a full view of all four sides of the Truck.

L. Vehicle Safety Plan: A plan with regard to City-contracted Vehicles, approved by the Contracting Agency, that includes the components listed in Section 2.03(A) through (F) of this rider.

Section 2.01 Vehicle Requirements

All City-contracted Vehicles shall conform to the following requirements:

A. Truck Surround Cameras: All Trucks, other than High Vision Trucks, shall be outfitted with truck surround cameras in accordance with the following schedule:
   a. Contracts involving 10 or fewer Trucks: No later than 12 months from Registration.
   b. Contracts involving more than 10 Trucks: No later than 18 months from Registration.
   c. New or replacement Truck acquired after work under this Agreement has begun: Truck must be outfitted with Truck Surround Cameras within 12 months from the date of first using such Truck.
   d. Contractor must submit to the Contracting Agency photographic and purchase order evidence, that is satisfactory to the Contracting Agency, of compliance with this Paragraph (A).

B. Truck Side-guards: Contractor shall provide side-guards for City-contracted Vehicles as applicable pursuant to Section 6-141 of the New York City Administrative Code.

C. Telematics: All City-contracted Vehicles must be installed with Telematics. Data gathered by Telematics must be made available in a manner that is satisfactory to the Contracting Agency.

Section 2.02 Safety Requirements

Contractor shall provide the following:

A. Licensing: Contractors shall ensure proper licensing for all drivers who operate City-contracted Vehicles. Contractors shall ensure that all drivers operating City-contracted Vehicles are enrolled in the New York State License Notification System (LENS) and that all out-of-state licenses are being monitored by Contractor. Contractor must notify the Contracting Agency of any license suspensions and/or arrests tied to unsafe or illegal vehicle operation by any drivers of City-contracted Vehicles.

B. Training: Contractor must provide the Contracting Agency documentation, satisfactory to the Contracting Agency, showing:
    a. That all drivers of City-contracted Vehicles have taken a New York State approved defensive driving class within six months after Registration; or
    b. That all drivers of City-contracted Vehicles have attended a New York State-approved defensive driving class within 3 years prior to Registration; or
    c. That all drivers of City-contracted Vehicles have received alternative safe driver training acceptable to the Contracting Agency that is documented to the satisfaction of the Contracting agency.

C. Crash tracking: Contractors must notify the Contracting Agency of any and all collisions that take place involving City-contracted Vehicles while performing services under this Agreement.

Section 2.03 Vehicle Safety Plan

Within one month after Registration, the Contractor must submit, for review and approval, to Contracting Agency, at the address set forth in the Agreement for notices to the City, and DCAS Fleet (C/O Chief Fleet Management Officer, 23rd Floor South, Municipal Building, 1 Centre Street, NY, NY 10007) a proposed vehicle safety plan that shall include at the minimum the components listed in Paragraphs (A) through (E) below. If directed by the Contracting Agency,

Contractor shall revise said proposed vehicle safety plan in accordance with the directions of the Contracting Agency, and until the Contracting Agency issues its approval thereof, Contractor shall submit a revised proposed vehicle safety plan to the Contracting Agency in each case, within 15 days after receipt by Contractor of directions to that effect from the Contracting Agency. Upon approval of the proposed vehicle safety plan, said proposed plan shall be considered the Vehicle Safety Plan and Contractor shall comply with the terms thereof. Each second anniversary of the approval of the Vehicle Safety Plan the Contractor shall submit an update thereof. The Vehicle Safety Plan shall include at the minimum the following components:

A. Vehicle List: List of City-contracted Vehicles, including the year, make, model, VIN and license plate number of each City-contracted Vehicle;

B. Safety Training: Documentation showing that all drivers of City-contracted Vehicles have completed the training detailed in section 2.02(B) of this Rider;

C. Technology: A list of all relevant technology investments installed on City-contracted vehicles, including but not limited to the technology listed in section 2.01 of this Rider;

D. Crash Tracking: An explanation of Contractor's process of monitoring and reviewing collisions including plans to notify Contracting Agency of collisions that take place while performing services under this Agreement;

E. Corrective Action: A corrective action program for drivers of City-contracted Vehicles that engage in unsafe or dangerous driving behaviors and license monitoring; and

F. Additional Safety Measures: Contractor must indicate if there are any additional safety technologies, safety practices, training, or other procedures that are utilized for City-contracted Vehicles during the term of this Agreement.

Section 3.01 Liquidated Damages

A. Contractor acknowledges that its failure to comply with the provisions of this Vehicle Safety Plan will cause loss and damage to the City, the precise extent of which is difficult to ascertain in monetary terms. For this reason, the parties desire to provide fair and reasonable compensation to the City for such losses, which compensation shall not be construed as a penalty. It is therefore agreed that, in addition to any other liquidated damages that the Contractor shall be required to pay to the City in accordance with the provisions of the Agreement, Contractor shall pay to the City the following:
    a. The sum of $500.00 for each instance of a failure by the Contractor to submit a Vehicle Safety Plan in accordance with the provisions of Section 2.03.

b. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(A) [Licensing].
c. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(B) [Training].
d. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(C) [Crash Tracking].
e. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.01(C) [Telematics].
f. The sum of $3,000 for each instance of a failure by the Contractor to comply with the provisions of Section 2.01(A).
g. The Contracting Agency will provide at least 5 working days of notice to the Contractor and opportunity to rectify before implementing these liquidated damages.

B. Liquidated damages received pursuant to this Agreement are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the City's right to indemnification, or the Contractor's obligation to indemnify the City, or to any other remedy provided for in this Agreement or by Law. The City may deduct and retain out of the monies which may become due under this Agreement, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the City, the Contractor shall be liable to pay the difference.

CITY OF NEW YORK

STANDARD CONSTRUCTION CONTRACT

March 2017

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CITY OF NEW YORK STANDARD CONSTRUCTION CONTRACT

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WITNESSETH:

The parties, in consideration of the mutual agreements contained herein, agree as follows:

CHAPTER I: THE CONTRACT AND DEFINITIONS

ARTICLE 1. THE CONTRACT

1.1 Except for titles, subtitles, headings, running headlines, tables of contents and indices (all of which are printed herein merely for convenience), the following, except for such portions thereof as maybe specifically excluded, shall be deemed to be part of this **Contract**:

1.1.1 All provisions required by law to be inserted in this **Contract**, whether actuallyinserted or not;

1.1.2 The Contract Drawings and Specifications;

1.1.3 The General Conditions and Special Conditions, if any;

1.1.4 The **Contract**;

1.1.5 The Information for Bidders; Request for Proposals; Notice of Solicitation andProposal For Bids; Bid or Proposal, and, if used, the Bid Booklet;

1.1.6 All Addenda issued prior to the receipt of the bids; the Notice of Award; Performance and Payment Bonds, if required; and the Notice to Proceed or the Order to Work.

1.2 Should any conflict occur in or between the Drawings and Specifications, the **Contractor** shall be deemed to have estimated the most expensive way of doing the **Work**, unless the **Contractor** shall have asked for and obtained a decision in writing from the **Commissioner** of the **Agency** that is entering into this **Contract**, before the submission of its bid, as to what shall govern.

ARTICLE 2. DEFINITIONS

2.1 The following words and expressions, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless a different meaning is clear from the context:

2.1.1 **"Addendum"** or **"Addenda"** shall mean the additional Contract provisions and/or technical clarifications issued in writing by the Commissioner prior to the receipt of bids.

2.1.2 **"Agency"** shall mean a city, county, borough or other office, position, department, division, bureau, board or commission, or a corporation, institution or agency of government, the expenses of which are paid in whole or in part from the City treasury.

2.1.3 **"Agency Chief Contracting Officer" (ACCO)** shall mean a person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the CCPO, or his/her duly authorized representative.

2.1.4 **"Allowance"** shall mean a sum of money which the Agency may include in the total amount of the Contract for such specific contingencies as the Agency believes may be necessary to complete the Work, *e.g.*, lead or asbestos remediation, and for which the Contractor will be paid on the basis of stipulated unit prices or a formula set forth in the Contract or negotiated between the parties provided, however, that if the Contractor is not directed to use the Allowance, the Contractor shall have no right to such money and it shall be deducted from the total amount of the Contract.

2.1.5 **"City"** shall mean the City of New York.

2.1.6 **"City Chief Procurement Officer" (CCPO)** shall mean a person delegated authority by the Mayor to coordinate and oversee the procurement activity of Mayoral agency staff, including the ACCO and any offices which have oversight responsibility for the procurement of construction, or his/her duly authorized representative.

2.1.7 **"Commissioner"** shall mean the head of the Agency that has entered into this Contract, or his/her duly authorized representative.

2.1.8 **"Comptroller"** shall mean the Comptroller of the City of New York.

2.1.9 **"Contract"** or **"Contract Documents"** shall mean each of the various parts of the contract referred to in Article 1 hereof, both as a whole and severally.

2.1.10 **"Contract Drawings"** shall mean only those drawings specifically entitled as such and listed in the Specifications or in any Addendum, or any drawings furnished by the Commissioner, pertaining or supplemental thereto.

2.1.11 **"Contract Work"** shall mean everything required to be furnished and done by the Contractor by any one or more of the parts of the Contract referred to in Article 1, except Extra Work as hereinafter defined.

2.1.12 **"Contractor"** shall mean the entity which executed this Contract, whether a corporation, firm, partnership, joint venture, individual, or any combination thereof, and its, their, his/her successors, personal representatives, executors, administrators, and assigns, and any person, firm, partnership, joint venture, individual, or corporation which shall at any time be substituted in the place of the Contractor under this Contract.

2.1.13 **"Days"** shall mean calendar days, except where otherwise specified.

2.1.14 **"Engineer"** or **"Architect"** or **"Project Manager"** shall mean the person so designated in writing by the Commissioner in the Notice to Proceed or the Order to Work to act as such in relation to this Contract, including a private Architect or Engineer or Project Manager, as the case may be. Subject to written approval by the Commissioner, the Engineer, Architect or Project Manager may designate an authorized representative.

2.1.15 **"Engineering Audit Officer" (EAO)** shall mean the person so designated by the Commissioner to perform responsible auditing functions hereunder.

2.1.16 **"Extra Work"** shall mean Work other than that required by the Contract at the time of award which is authorized by the Commissioner pursuant to Chapter VI of this Contract.

2.1.17 **"Federal-Aid Contract"** shall mean a contract in which the United States (federal) Government provides financial funding as so designated in the Information for Bidders.

2.1.18 **"Final Acceptance"** shall mean final written acceptance of all the Work by the Commissioner, a copy of which shall be sent to the Contractor.

2.1.19 **"Final Approved Punch List"** shall mean a list, approved pursuant to Article 14.2.2, specifying those items of Work to be completed by the Contractor after Substantial Completion and dates for the completion of each item of Work.

2.1.20 **"Law"** or **"Laws"** shall mean the Constitution of the State of New York, the New York City Charter, the New York City Administrative Code, a statute of the United States or of the State of New York, a local law of the City of New York, any ordinance, rule or regulation having the force of law, or common law.

2.1.21 **"Materialman"** shall mean any corporation, firm, partnership, joint venture, or individual, other than employees of the Contractor, who or which contracts with the Contractor or any Subcontractor, to fabricate or deliver, or who actually fabricates or delivers, plant, materials or equipment to be incorporated in the Work.

2.1.22 **"Means and Methods of Construction"** shall mean the labor, materials, temporary structures, tools, plant, and construction equipment, and the manner and time of their use, necessary to accomplish the result intended by this Contract.

2.1.23**"Notice to Proceed" or "Order to Work"** shall mean the written notice issued bythe Commissioner specifying the time for commencement of the Work and the Engineer, Architect or Project Manager.

2.1.24 **"Other Contractor(s)"** shall mean any contractor (other than the entity which executed this Contract or its Subcontractors) who or which has a contract with the City for work on or adjacent to the building or Site of the Work.

2.1.25 **"Payroll Taxes"** shall mean State Unemployment Insurance (SUI), Federal Unemployment Insurance (FUI), and payments pursuant to the Federal Insurance Contributions Act (FICA).

2.1.26 **"Project"** shall mean the public improvement to which this Contract relates.

2.1.27 **"Procurement Policy Board" (PPB)** shall mean the Agency of the City of New York whose function is to establish comprehensive and consistent procurement policies and rules which shall have broad application throughout the City.

2.1.28 **"Required Quantity"** in a unit price Contract shall mean the actual quantity of any item of Work or materials which is required to be performed or furnished in order to comply with the Contract.

2.1.29 **"Resident Engineer"** shall mean the representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the Work.

2.1.30 **"Site"** shall mean the area upon or in which the Contractor's operations are carried on, and such other areas adjacent thereto as may be designated as such by the Engineer.

2.1.31 **"Small Tools"** shall mean items that are ordinarily required for a worker's job

function, including but not limited to, equipment that ordinarily has no licensing, insurance or substantive storage costs associated with it; such as circular and chain saws, impactdrills, threaders, benders, wrenches, socket tools, etc.

2.1.32 **"Specifications"** shall mean all of the directions, requirements, and standards of performance applying to the Work as hereinafter detailed and designated under the Specifications.

2.1.33 **"Subcontractor"** shall mean any person, firm or corporation, other than employees of the Contractor, who or which contracts with the Contractor or with its subcontractors to furnish, or actually furnishes labor, or labor and materials, or labor and equipment, or superintendence, supervision and/or management at the Site. Wherever the word Subcontractor appears, it shall also mean sub-Subcontractor.

2.1.34 **"Substantial Completion"** shall mean the written determination by the Engineer that the Work required under this Contract is substantially, but not entirely, complete and the approval of the **Final Approved Punch List**.

2.1.35 **"Work"** shall mean all services required to complete the Project in accordance with the Contract Documents, including without limitation, labor, material, superintendence, management, administration, equipment, and incidentals, and obtaining any and all permits, certifications and licenses as may be necessary and required to complete the Work, and shall include both Contract Work and Extra Work.

CHAPTER II: THE WORK AND ITS PERFORMANCE

ARTICLE 3. CHARACTER OF THE WORK

3.1 Unless otherwise expressly provided in the **Contract Drawings**, **Specifications,** and **Addenda**, the **Work** shall be performed in accordance with the best modern practice, utilizing, unless otherwise specified in writing, new and unused materials of standard first grade quality and workmanship anddesign of the highest quality, to the satisfaction of the **Commissioner**.

ARTICLE 4. MEANS AND METHODS OF CONSTRUCTION

4.1 Unless otherwise expressly provided in the **Contract Drawings**, **Specifications,** and **Addenda**, the **Means and Methods of Construction** shall be such as the **Contractor** may choose; subject, however, to the **Engineer's** right to reject the **Means and Methods of Construction** proposed by the **Contractor** which in the opinion of the **Engineer**:

4.1.1 Will constitute or create a hazard to the **Work**, or to persons or property; or

4.1.2 Will not produce finished **Work** in accordance with the terms of the **Contract**; or

4.1.3 Will be detrimental to the overall progress of the **Project**.

4.2 The **Engineer's** approval of the **Contractor's Means and Methods of Construction**, orhis/her failure to exercise his/her right to reject such means or methods, shall not relieve the **Contractor** of its obligation to complete the **Work** as provided in this **Contract**; nor shall the exercise of such rightto reject

create a cause of action for damages.

ARTICLE 5. COMPLIANCE WITH LAWS

5.1 The **Contractor** shall comply with all **Laws** applicable to this **Contract** and to the **Work** to be done hereunder.

5.2 Procurement Policy Board Rules: This **Contract** is subject to the Rules of the **PPB** ("**PPB** Rules") in effect at the time of the bid opening for this **Contract**. In the event of a conflict between the **PPB** Rules and a provision of this **Contract**, the **PPB** Rules shall take precedence.

5.3 Noise Control Code provisions.

5.3.1 In accordance with the provisions of Section 24-216(b) of the Administrative Code of the **City** ("Administrative Code"), Noise Abatement Contract Compliance, devices and activities which will be operated, conducted, constructed or manufactured pursuant to this **Contract** and which are subject to the provisions of the **City** Noise Control Code shall be operated, conducted, constructed, or manufactured without causing a violation of the Administrative Code. Such devices and activities shall incorporate advances in the art of noise control development for the kind and level of noise emitted or produced by such devices and activities, in accordance with regulations issued by the **Commissioner** of the **City** Department of Environmental Protection.

5.3.2 The **Contractor** agrees to comply with Section 24-219 of the Administrative Code and implementing rules codified at 15 Rules of the City of New York ("RCNY") Section 28-100 *et seq*. In accordance with such provisions, the **Contractor**, if the **Contractor** is the responsible party under such regulations, shall prepare and post a Construction Noise Mitigation Plan at each **Site**, in which the **Contractor** shall certify that all construction tools and equipment have been maintained so that they operate at normal manufacturers operating specifications. If the **Contractor** cannot make this certification, it must have in place an Alternative Noise Mitigation Plan approved by the **City** Department of Environmental Protection. In addition, the **Contractor**'s certified Construction Noise Mitigation Plan is subject inspection by the **City** Department of Environmental Protection in accordance with Section 28-101 of Title 15 of RCNY. No **Contract Work** may take place at a **Site** unless there is a Construction Noise Mitigation Plan or approved Alternative Noise Mitigation Plan in place. In addition, the **Contractor** shall create and implement a noise mitigation training program. Failure to comply with these requirements may result in fines and other penalties pursuant to the applicable provisions of the Administrative Code and RCNY.

5.4 Ultra Low Sulfur Diesel Fuel: In accordance with the provisions of Section 24-163.3 of the Administrative Code, the **Contractor** specifically agrees as follows:

5.4.1 Definitions. For purposes of this Article 5.4, the following definitions apply:

5.4.1(a) "Contractor" means any person or entity that enters into a Public Works Contract with a **City Agency**, or any person or entity that enters into an agreement with such person or entity, to perform work or provide labor or services related to such Public Works Contract.

5.4.1(b) "Motor Vehicle" means any self-propelled vehicle designed for transporting

persons or property on a street or highway.

5.4.1(c) "Nonroad Engine" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition,or that is not subject to standards promulgated under Section 7411 or Section 7521 of Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.4.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower and greater, and that is not a Motor Vehicle or a vehicle used solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except that this term shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) horsepower or less and that are not used in any construction program or project.

5.4.1(e) "Public Works Contract" means a contract with a **City Agency** for a construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; a contract with a **City Agency** for the preparation for any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; or a contract with a **City Agency** for any final work involved in the completion of any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge.

5.4.1(f) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.4.2 Ultra Low Sulfur Diesel Fuel

5.4.2(a) All **Contractors** shall use Ultra Low Sulfur Diesel Fuel in diesel-powered Nonroad Vehicles in the performance of this **Contract**.

5.4.2(b) Notwithstanding the requirements of Article 5.4.2(a), **Contractors** may use diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm)to fulfill the requirements of this Article 5.4.2, where the Commissioner of the **City** Department of Environmental Protection ("DEP Commissioner") has issued a determination that a sufficient quantity of Ultra Low Sulfur Diesel Fuel is not available to meet the needs of **Agencies** and **Contractors**. Any such determination shall expire after six (6) months unless renewed.

5.4.2(c) **Contractors** shall not be required to comply with this Article 5.4.2 where the **City Agency** letting this **Contract** makes a written finding, which is approved, in writing, by the DEP Commissioner, that a sufficient quantity of Ultra Low Sulfur Diesel Fuel, or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is not available to meet the requirements of Section 24-163.3 of the Administrative Code, provided that such **Contractor** in its fulfillment of the requirements of this **Contract**, to the extent practicable, shall use whatever quantity of Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per

million (30 ppm) is available. Any finding made pursuant to this Article 5.4.2(c) shall expire after sixty (60) **Days**, at which time the requirements of this Article 5.4.2 shall be in full force and effect unless the **City Agency** renews the finding in writing and such renewal is approved by the DEP Commissioner.

5.4.2(d) **Contractors** may check on determinations and approvals issued by the DEP Commissioner pursuant to Section 24-163.3 of the Administrative Code, if any, at www.dep.nyc.gov or by contacting the **City Agency** letting this **Contract**.

5.4.2(e) The requirements of this Article 5.4.2 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.3 Best Available Technology

5.4.3(a) All **Contractors** shall utilize the best available technology for reducing the emission of pollutants for diesel-powered Nonroad Vehicles in the performance of this **Contract**. For determinations of best available technology for each type of diesel-powered Nonroad Vehicle, **Contractors** shall comply with the regulations of the **City** Department of Environmental Protection, as and when adopted, Chapter 14of Title 15 of the Rules of the City of New York (RCNY). The **Contractor** shall fully document all steps in the best available technology selection process and shall furnish such documentation to the **City Agency** or the DEP Commissioner upon request. The **Contractor** shall retain all documentation generated in the best available technology selection process for as long as the selected best available technology is in use.

5.4.3(b) No **Contractor** shall be required to replace best available technology for reducing the emission of pollutants or other authorized technology utilized for a diesel-powered Nonroad Vehicle in accordance with the provisions of this Article 5.4.3 within three (3) years of having first utilized such technology for such vehicle.

5.4.3(c) This Article 5.4.3 shall not apply to any vehicle used to satisfy the requirements of a specific Public Works Contract for fewer than twenty (20) **Days**.

5.4.3(d) The **Contractor** shall not be required to comply with this Article 5.4.3 with respect to a diesel-powered Nonroad Vehicle under the following circumstances:

5.4.3(d)(i) Where the **City Agency** makes a written finding, which is approved, in writing, by the DEP Commissioner, that the best available technology for reducing the emission of pollutants as required by this Article 5.4.3 is unavailable for such vehicle, the **Contractor** shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle.

5.4.3(d)(ii) Where the DEP Commissioner has issued a written waiver based upon the Contractor having demonstrated to the DEP Commissioner that the use of the best available technology for reducing the emission of pollutants might endanger the operator of such vehicle or those working near such vehicle, due to engine malfunction, the **Contractor** shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle, which would not endanger the operator of such vehicle or those working near such vehicle.

5.4.3(d)(iii) In determining which technology to use for the purposes of Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above, the **Contractor** shall primarily consider the reduction in emissions of particulate matter and secondarily consider the reduction in emissions of nitrogen oxides associated with the use of such technology, which shall in no event result in an increase in the emissions of either such pollutant.

5.4.3(d)(iv) The **Contractor** shall submit requests for a finding or a waiver pursuant to this Article 5.4.3(d) in writing to the DEP Commissioner, with a copy to the **ACCO** of the **City Agency** letting this **Contract**. Any finding or waiver made or issued pursuant to Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above shall expire after one hundred eighty (180) **Days**, at which time the requirements of Article 5.4.3(a) shall be in full force and effect unless the **City Agency** renews the finding, in writing, and the DEP Commissioner approves such finding, in writing, or the DEP Commissioner renews the waiver, in writing.

5.4.3(e) The requirements of this Article 5.4.3 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.4 Section 24-163 of the Administrative Code. The **Contractor** shall comply with Section 24-163 of the Administrative Code related to the idling of the engines of motor vehicles while parking.

5.4.5 Compliance

5.4.5(a) The **Contractor's** compliance with Article 5.4 may be independently monitored. If it is determined that the **Contractor** has failed to comply with any provision of Article 5.4, any costs associated with any independent monitoring incurred by the **City** shall be reimbursed by the **Contractor**.

5.4.5(b) Any **Contractor** who violates any provision of Article 5.4, except as provided in Article 5.4.5(c) below, shall be liable for a civil penalty between the amounts of one thousand ($1,000) and ten thousand ($10,000) dollars, in addition to twice the amount of money saved by such **Contractor** for failure to comply with Article 5.4.

5.4.5(c) No **Contractor** shall make a false claim with respect to the provisions of Article 5.4 to a **City Agency**. Where a **Contractor** has been found to have done so, such **Contractor** shall be liable for a civil penalty of twenty thousand ($20,000) dollars, in addition to twice the amount of money saved by such **Contractor** in association with having made such false claim.

5.4.6 Reporting

5.4.6(a) For all Public Works Contracts covered by this Article 5.4, the **Contractor** shall report to the **City Agency** the following information:

5.4.6(a)(i) The total number of diesel-powered Nonroad Vehicles used to fulfill the requirements of this Public Works Contract;

5.4.6(a)(ii) The number of such Nonroad Vehicles that were powered by Ultra Low Sulfur Diesel Fuel;

5.4.6(a)(iii) The number of such Nonroad Vehicles that utilized the best available technology for reducing the emission of pollutants, including a breakdown by vehicle model and the type of technology;

5.4.6(a)(iv) The number of such Nonroad Vehicles that utilized such other authorized technology in accordance with Article 5.4.3, including a breakdown by vehicle model and the type of technology used for each such vehicle;

5.4.6(a)(v) The locations where such Nonroad Vehicles were used; and

5.4.6(a)(vi) Where a determination is in effect pursuant to Article 5.4.2(b) or 5.4.2(c), detailed information concerning the **Contractor's** efforts to obtain Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm).

5.4.6(b) The **Contractor** shall submit the information required by Article 5.4.6(a) at the completion of **Work** under the Public Works Contract and on a yearly basis no later than August 1 throughout the term of the Public Works Contract. The yearly report shall cover **Work** performed during the preceding fiscal year (July 1 - June 30).

5.5 Ultra Low Sulfur Diesel Fuel. In accordance with the Coordinated Construction Act for Lower Manhattan, as amended:

5.5.1 Definitions. For purposes of this Article 5.5, the following definitions apply:

5.5.1(a) "Lower Manhattan" means the area to the south of and within the following lines: a line beginning at a point where the United States pierhead line in the Hudson River as it exists now or may be extended would intersect with the southerly line of West Houston Street in the Borough of Manhattan extended, thence easterly along the southerly side of West Houston Street to the southerly side of Houston Street, thence easterly along the southerly side of Houston Street to the southerly side of East Houston Street, thence northeasterly along the southerly side of East Houston Street to the point where it would intersect with the United States pierhead line in the East River as it exists now or may be extended, including tax lots within or immediately adjacent thereto.

5.5.1(b) "Lower Manhattan Redevelopment Project" means any project in Lower Manhattan that is funded in whole or in part with federal or State funding, or any project intended to improve transportation between Lower Manhattan and the two air terminals in the **City** known as LaGuardia Airport and John F. Kennedy International Airport, or between Lower Manhattan and the air terminal in Newark known as Newark Liberty International Airport, and that is funded in whole or in part with federal funding.

5.5.1(c) "Nonroad Engine" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under Section 7411 or Section 7521 of Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.5.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower (HP) and greater, and that is not a Motor Vehicle or a vehicle used

solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except that this terms shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) HP or less and that are not used in any construction program or project.

5.5.1(e) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.5.2 Requirements. **Contractors** and **Subcontractors** are required to use only Ultra Low Sulfur Diesel Fuel to power the diesel-powered Nonroad Vehicles with engine HP rating of fifty (50) HP and above used on a Lower Manhattan Redevelopment Project and, where practicable, to reduce the emission of pollutants by retrofitting such Nonroad Vehicles with oxidation catalysts, particulate filters, or technology that achieves lowest particulate matter emissions.

5.6 Pesticides. In accordance with Section 17-1209 of the Administrative Code, to the extent that the **Contractor** or any **Subcontractor** applies pesticides to any property owned or leased by the **City**, the **Contractor,** and any **Subcontractor** shall comply with Chapter 12 of the Administrative Code.

5.7 Waste Treatment, Storage, and Disposal Facilities and Transporters. In connection withthe **Work**, the **Contractor** and any **Subcontractor** shall use only those waste treatment, storage, and disposal facilities and waste transporters that possess the requisite license, permit or other governmental approval necessary to treat, store, dispose, or transport the waste, materials or hazardous substances.

5.8 Environmentally Preferable Purchasing. The **Contractor** shall ensure that products purchased or leased by the **Contractor** or any **Subcontractor** for the **Work** that are not specified by the **City** or are submitted as equivalents to a product specified by the **City** comply with the requirements of the New York City Environmentally Preferable Purchasing Program contained in Chapter 11 of Title 43 of the RCNY, pursuant to Chapter 3 of Title 6 of the Administrative Code.

ARTICLE 6. INSPECTION

6.1 During the progress of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall at all times afford the representatives of the **City** every reasonable, safe, and proper facility for inspecting all **Work** done or being done at the **Site** and also for inspecting the manufacture or preparation of materials and equipment at the place of such manufacture or preparation.

6.2 The **Contractor's** obligation hereunder shall include the uncovering or taking down of finished **Work** and its restoration thereafter; provided, however, that the order to uncover, take down and restore shall be in writing, and further provided that if **Work** thus exposed proves satisfactory, and if the **Contractor** has complied with Article 6.1, such uncovering or taking down and restoration shall be considered an item of **Extra Work** to be paid for in accordance with the provisions of Article 26. If the **Work** thus exposed proves unsatisfactory, the **City** has no obligation to compensate the **Contractor** for the uncovering, taking down or restoration.

6.3 Inspection and approval by the **Commissioner**, the **Engineer**, **Project Manager**, or **Resident Engineer**, of finished **Work** or of **Work** being performed, or of materials and equipment at the place of manufacture or preparation, shall not relieve the **Contractor** of its obligation to perform the **Work** in strict accordance with the **Contract**. Finished or unfinished **Work** not found to be in strict accordance with the

Contract shall be replaced as directed by the **Engineer**, even though such **Work** may have been previously approved and paid for. Such corrective **Work** is **Contract Work** and shall not be deemed **Extra Work**.

6.4 Rejected **Work** and materials shall be promptly taken down and removed from the **Site**, which must at all times be kept in a reasonably clean and neat condition.

ARTICLE 7. PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICESAND INDEMNIFICATION

7.1 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall be under an absolute obligation to protect the finished and unfinished **Work** against any damage, loss, injury, theft and/or vandalism and in the event of such damage, loss, injury, theft and/or vandalism,it shall promptly replace and/or repair such **Work** at the **Contractor's** sole cost and expense, as directed by the **Resident Engineer**. The obligation to deliver finished **Work** in strict accordance with the **Contract** prior to **Final Acceptance** shall be absolute and shall not be affected by the **Resident Engineer's** approval of, or failure to prohibit, the **Means and Methods of Construction** used by the **Contractor**.

7.2 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall take all reasonable precautions to protect all persons and the property of the **City** and of others from damage, loss or injury resulting from the **Contractor's**, and/or its **Subcontractors'** operations under this **Contract.** The **Contractor's** obligation to protect shall include the duty to provide, place or replace, and adequately maintain at or about the **Site** suitable and sufficient protection such as lights, barricades, and enclosures.

7.3 The **Contractor** shall comply with the notification requirements set forth below in the event of any loss, damage or injury to **Work**, persons or property, or any accidents arising out of the operations of the **Contractor** and/or its **Subcontractors** under this **Contract**.

7.3.1 The **Contractor** shall make a full and complete report in writing to the **Resident Engineer** within three (3) **Days** after the occurrence.

7.3.2 The **Contractor** shall also send written notice of any such event to all insurance carriers that issued potentially responsive policies (including commercial general liability insurance carriers for events relating to the **Contractor**'s own employees) no later than twenty (20) days after such event and again no later than twenty (20) days after the initiation of any claim and/or action resulting therefrom. Such notice shall contain the following information: the number of the insurance policy, the name of the Named Insured, the date and location of the incident, and the identity of the persons injured or property damaged. For any policy on which the **City** and/or the **Engineer**, **Architect**, or **Project Manager** are Additional Insureds, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Additional Insured, such other AdditionalInsureds, as well as the Named Insured."

7.3.2(a) Whenever such notice is sent under a policy on which the **City** is an Additional Insured, the **Contractor** shall provide copies of the notice to the **Comptroller,** the **Commissioner** and the **City** Corporation Counsel. The copy to the **Comptroller** shall be sent to the Insurance Unit, NYC Comptroller's Office, 1 Centre Street – Room 1222, New York, New York, 10007. The copy to the **Commissioner** shall be sent to the address set forth in Schedule A of the General Conditions. The copy to the **City** Corporation Counsel shall be sent to Insurance Claims Specialist, Affirmative Litigation

Division, New York City Law Department, 100 Church Street, New York, New York 10007.

7.3.2(b) If the **Contractor** fails to provide any of the foregoing notices to anyappropriate insurance carrier(s) in a timely and complete manner, the **Contractor**shall indemnify the **City** for all losses, judgments, settlements, and expenses, including reasonable attorneys' fees, arising from an insurer's disclaimer of coverage citing late notice by or on behalf of the **City**.

7.4 To the fullest extent permitted by law, the **Contractor** shall defend, indemnify, and hold the **City**, its employees, and officials (the "Indemnitees") harmless against any and all claims (including but not limited to claims asserted by any employee of the **Contractor** and/or its **Subcontractors**) and costs and expenses of whatever kind (including but not limited to payment or reimbursement of attorneys' fees and disbursements) allegedly arising out of or in any way related to the operations of the **Contractor** and/or its **Subcontractors** in the performance of this **Contract** or from the **Contractor's** and/or its **Subcontractors'** failure to comply with any of the provisions of this **Contract** or of the **Law**. Such costs and expenses shall include all those incurred in defending the underlying claim and those incurred in connection with the enforcement of this Article 7.4 by way of cross-claim, third-party claim, declaratory action or otherwise. The parties expressly agree that the indemnification obligation hereunder contemplates (1) full indemnity in the event of liability imposed against the Indemnitees without negligence and solely by reason of statute, operation of **Law** or otherwise; and (2) partial indemnity in the event of any actual negligence on the part of the Indemnitees either causing orcontributing to the underlying claim (in which case, indemnification will be limited to any liability imposed over and above that percentage attributable to actual fault whether by statute, by operation of **Law**, or otherwise). Where partial indemnity is provided hereunder, all costs and expenses shall be indemnified on a pro rata basis.

7.4.1 Indemnification under Article 7.4 or any other provision of the **Contract** shall operate whether or not **Contractor** or its **Subcontractors** have placed and maintained the insurance specified under Article 22.

7.5 The provisions of this Article 7 shall not be deemed to create any new right of action in favor of third parties against the **Contractor** or the **City**.

CHAPTER III: TIME PROVISIONS

ARTICLE 8. COMMENCEMENT AND PROSECUTION OF THE WORK

8.1 The **Contractor** shall commence the **Work** on the date specified in the **Notice to Proceed** or the **Order to Work**. The time for performance of the **Work** under the **Contract** shall be computed from the date specified in the **Notice to Proceed** or the **Order to Work**. **TIME BEING OF THE ESSENCE** to the **City**, the **Contractor** shall thereafter prosecute the **Work** diligently, using such **Means and Methods of Construction** as are in accord with Article 4 herein and as will assure its completion not later than the date specified in this Contract, or on the date to which the time for completion may be extended.

ARTICLE 9. PROGRESS SCHEDULES

9.1 To enable the **Work** to be performed in an orderly and expeditious manner, the **Contractor**, within fifteen (15) **Days** after the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Engineer**, shall submit to the **Engineer** a proposed progress schedule based on the Critical Path Methodin the form of

a bar graph or in such other form as specified by the **Engineer**, and monthly cash flow requirements, showing:

9.1.1 The anticipated time of commencement and completion of each of the variousoperations to be performed under this **Contract**; and

9.1.2 The sequence and interrelation of each of these operations with the others and with those of other related contracts; and

9.1.3 The estimated time required for fabrication or delivery, or both, of all materials and equipment required for the **Work**, including the anticipated time for obtaining required approvals pursuant to Article 10; and

9.1.4 The estimated amount in dollars the **Contractor** will claim on a monthly basis.

9.2 The proposed schedule shall be revised as directed by the **Engineer**, until finally approved by the **Engineer**, and after such approval, subject to the provisions of Article 11, shall be strictly adhered to by the **Contractor**.

9.3 If the **Contractor** shall fail to adhere to the approved progress schedule, or to the schedule as revised pursuant to Article 11, it shall promptly adopt such other or additional **Means and Methods of Construction**, at its sole cost and expense, as will make up for the time lost and will assure completion in accordance with the approved progress schedule. The approval by the **City** of a progress schedule which is shorter than the time allotted under the **Contract** shall not create any liability for the **City** if the approved progress schedule is not met.

9.4 The **Contractor** will not receive any payments until the proposed progress schedule is submitted.

ARTICLE 10. REQUESTS FOR INFORMATION OR APPROVAL

10.1 From time to time as the **Work** progresses and in the sequence indicated by the approved progress schedule, the **Contractor** shall submit to the **Engineer** a specific request in writing for each item of information or approval required by the **Contractor**. These requests shall state the latest date upon which the information or approval is actually required by the **Contractor**, and shall be submitted in a reasonable time in advance thereof to provide the **Engineer** a sufficient time to act upon such submissions, or any necessary re-submissions thereof.

10.2 The **Contractor** shall not have any right to an extension of time on account of delays due to the **Contractor's** failure to submit requests for the required information or the required approval in accordance with the above requirements.

ARTICLE 11. NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY

11.1 After the commencement of any condition which is causing or may cause a delay in completion of the **Work**, including conditions for which the **Contractor** may be entitled to an extension of time, the following notifications and submittals are required:

11.1.1 Within fifteen (15) **Days** after the **Contractor** becomes aware or reasonably should be

aware of each such condition, the **Contractor** must notify the **Resident Engineer** or **Engineer**, as directed by the **Commissioner**, in writing of the existence, nature and effect of such condition upon the approved progress schedule and the **Work**, and must state why and in what respects, if any, the condition is causing or may cause a delay. Such notice shall include a description of the construction activities that are or could be affected by the condition and may include any recommendations the **Contractor** may have to address the delay condition and any activities the **Contractor** may take to avoid or minimize the delay.

11.1.2 If the **Contractor** shall claim to be sustaining damages for delay as provided for in this Article 11,within forty-five (45) **Days** from the time such damages are first incurred for each such condition, the **Contractor** shall submit to the **Commissioner** a verified written statement of the details and estimates of the amounts of such damages, including categories of expected damages and projected monthly costs, together with documentary evidence of such damages as the **Contractor** may have at the time of submission ("statement of delay damages"), as further detailed in Article 11.6. The **Contractor** may submit the above statement within such additional time as may be granted by the **Commissioner** in writing upon written request therefor.

11.1.3 Articles 11.1.1 and 11.1.2 do not relieve the **Contractor** of its obligation to comply with the provisions of Article 44.

11.2 Failure of the **Contractor** to strictly comply with the requirements of Article 11.1.1 may, inthe discretion of the **Commissioner**, be deemed sufficient cause to deny any extension of time on account of delay arising out of such condition. Failure of the **Contractor** to strictly comply with the requirements of both Articles 11.1.1 and 11.1.2 shall be deemed a conclusive waiver by the **Contractor** of any and all claims for damages for delay arising from such condition and no right to recover on such claims shall exist.

11.3 When appropriate and directed by the **Engineer**, the progress schedule shall be revised by the **Contractor** until finally approved by the **Engineer**. The revised progress schedule must be strictly adhered to by the **Contractor**.

11.4 Compensable Delays

11.4.1 The **Contractor** agrees to make claim only for additional costs attributable to delayin the performance of this **Contrac**t necessarily extending the time for completion of the **Work** or resulting from acceleration directed by the **Commissioner** and required to maintain the progress schedule, occasioned solely by any act or omission to act of the **City** listed below. The **Contractor** also agrees that delay from any other cause shall be compensated, if at all, solely by an extension of time to complete the performance of the **Work**.

11.4.1.1 The failure of the **City** to take reasonable measures to coordinate and progress the **Work** to the extent required by the **Contract**, except that the City shall not be responsible for the **Contractor's** obligation to coordinate and progress the **Work** of its **Subcontractors**.

11.4.1.2 Unreasonable delays attributable to the review of shop drawings, the issuance of change orders, or the cumulative impact of change orders that were not brought about by any act or omission of the **Contractor**.

11.4.1.3 The unavailability of the **Site** caused by acts or omissions of the **City**..

11.4.1.4 The issuance by the **Engineer** of a stop work order that was not brought about through any act or omission of the **Contractor**.

11.4.1.5 Differing site conditions or environmental hazards that were neitherknown nor reasonably ascertainable on a pre-bid inspection of the **Site**or review

of the bid documents or other publicly available sources, and that are not ordinarily encountered in the **Project**'s geographical area or neighborhood or in the type of **Work** to be performed.

11.4.1.6 Delays caused by the **City's** bad faith or its willful, malicious, or grossly negligent conduct;

11.4.1.7 Delays not contemplated by the parties;

11.4.1.8 Delays so unreasonable that they constitute an intentional abandonment of the **Contract** by the **City**; and

11.4.1.9 Delays resulting from the **City's** breach of a fundamental obligation of the **Contract**.

11.4.2 No claim may be made for any alleged delay in **Substantial Completion** of the **Work** if the **Work** will be or is substantially completed by the date of **Substantial Completion** provided for in Schedule A unless acceleration has been directed by the **Commissioner** to meet the date of **Substantial Completion** set forth in Schedule A, or unless there is a provision in the **Contract** providing for additional compensation for early completion.

11.4.3 The provisions of this Article 11 apply only to claims for additional costs attributable to delay and do not preclude determinations by the **Commissioner** allowing reimbursements for additional costs for **Extra Work** pursuant to Articles 25 and 26 of this **Contract**. To the extent that any cost attributable to delay is reimbursed as part of a change order, no additional claim for compensation under this Article 11 shall be allowed.

11.5 Non-Compensable Delays. The **Contractor** agrees to make no claim for, and is deemed to have included in its bid prices for the various items of the **Contract**, the extra/additional costs attributable to any delays caused by or attributable to the items set forth below. For such items, the **Contractor** shall be compensated, if at all, solely by an extension of time to complete the performance of the **Work**, in accordance with the provisions of Article 13. Such extensions of time will be granted, if at all, pursuant to the grounds set forth in Article 13.3.

11.5.1 The acts or omissions of any third parties, including but not limited to **Other Contractors**, public/ governmental bodies (other than **City Agencies**), utilities or private enterprises, who are disclosed in the **Contract Documents** or are ordinarily encountered or generally recognized as related to the **Work**;

11.5.2 Any situation which was within the contemplation of the parties at the time of entering into the **Contract**, including any delay indicated or disclosed in the **Contract Documents** or that would be generally recognized by a reasonably prudent contractor as related to the nature of the **Work**, and/or the existence of any facility or appurtenance owned, operated or maintained by any third party, as indicated or disclosed in the **Contract Documents** or ordinarily encountered or generally recognized as related to the nature of the **Work**;

11.5.3 Restraining orders, injunctions or judgments issued by a court which were caused by a Contractor's submission, action or inaction or by a Contractor's **Means and Methods of Construction**, or by third parties, unless such order, injunction or judgment was the result of an act or omission by the **City**;

11.5.4 Any labor boycott, strike, picketing, lockout or similar situation;

11.5.5 Any shortages of supplies or materials, or unavailability of equipment, required by the **Contract Work**;

11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God, or acts of war or of the public enemy or terrorist acts, including the **City's** reasonable responses thereto; and

11.5.7 **Extra Work** which does not significantly affect the overall completion of the **Contract**, reasonable delays in the review or issuance of change orders or field orders and/or in shop drawing reviews or approvals.

11.6 Required Content of Submission of Statement of Delay Damages

11.6.1 In the verified written statement of delay damages required by Article 11.1.2, the following information shall be provided by the **Contractor**:

11.6.1.1 For each delay, the start and end dates of the claimed periods of delay and, in addition, a description of the operations that were delayed, an explanation of how they were delayed, and the reasons for the delay, including identifying the applicable act or omission of the City listed in Article 11.4.

11.6.1.2 A detailed factual statement of the claim providing all necessary dates, locations and items of **Work** affected by the claim.

11.6.1.3 The estimated amount of additional compensation sought and a breakdown of that amount into categories as described in Article 11.7.

11.6.1.4 Any additional information requested by the **Commissioner**.

11.7 Recoverable Costs

11.7.1 Delay damages may be recoverable for the following costs actually and necessarily incurred in the performance of the **Work**:

11.7.1.1 Direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits, based on time and materials records;

11.7.1.2 Necessary materials (including transportation to the **Site**), based on time and material records;

11.7.1.3 Reasonable rental value of necessary plant and equipment other than small tools, plus fuel/energy costs according to the applicable formula set forth in Articles 26.2.4 and/or 26.2.8, based on time and material records;

11.7.1.4 Additional insurance and bond costs;

11.7.1.5 Extended **Site** overhead, field office rental, salaries of field office staff, on-site project managers and superintendents, field office staff vehicles, **Project-**specific storage, field office utilities and telephone, and field office consumables;

11.7.1.6 Labor escalation costs based on actual costs;

11.7.1.7 Materials and equipment escalation costs based on applicable industry indices unless documentation of actual increased cost is provided;

11.7.1.8 Additional material and equipment storage costs based on actual documented costs and additional costs necessitated by extended manufacturer warranty periods; and

11.7.1.9 Extended home office overhead calculated based on the following formula:

(1) Subtract from the original **Contract** amount the amount earned by original contractual **Substantial Completion** date (not

including change orders);
(2) Remove 15% overhead and profit from the calculation in item (1) by dividing the results of item (1) by 1.15;
(3) Multiply the result of item (2) by 7.25% for the total home office overhead;
(4) Multiply the result of item (3) by 7.25% for the total profit; and
(5) The total extended home office overhead will be the total of items (3) and (4).

11.7.2 Recoverable Subcontractor Costs. When the **Work** is performed by a **Subcontractor**, the **Contractor** may be paid the actual and necessary costs of such subcontracted **Work** as outlined above in Articles 11.7.1.1 through 11.7.1.8, and an additional overhead of 5% of the costs outlined in Articles 11.7.1.1 through 11.7.1.3.

11.7.3 Non-Recoverable Costs. The parties agree that the **City** will have no liability for the following items and the **Contractor** agrees it shall make no claim for the following items:

11.7.3.1 Profit, or loss of anticipated or unanticipated profit, except as provided in Article 11.7.1.9;
11.7.3.2 Consequential damages, including, but not limited to, construction or bridge loans or interest paid on such loans, loss of bonding capacity, bidding opportunities, or interest in investment, or any resulting insolvency;
11.7.3.3 Indirect costs or expenses of any nature except those included in Article 11.7.1;
11.7.3.4 Direct or indirect costs attributable to performance of **Work** where the **Contractor**, because of situations or conditions within its control, hasnot progressed the **Work** in a satisfactory manner; and
11.7.3.5 Attorneys' fees and dispute and claims preparation expenses.

11.8 Any claims for delay under this Article 11 are not subject to the jurisdiction of the Contract Dispute Resolution Board pursuant to the dispute resolution process set forth in Article 27.

11.9 Any compensation provided to the **Contractor** in accordance with this Article 11 will be made pursuant to a claim filed with the **Comptroller**. Nothing in this Article 11 extendsthe time for the **Contractor** to file an action with respect to a claim within six months after **Substantial Completion** pursuant to Article 56.

ARTICLE 12. COORDINATION WITH OTHER CONTRACTORS

12.1 During the progress of the **Work**, **Other Contractors** may be engaged in performing other work or may be awarded other contracts for additional work on this **Project**. In that event, the **Contractor** shall coordinate the **Work** to be done hereunder with the work of such **Other Contractors** and the **Contractor** shall fully cooperate with such **Other Contractors** and carefully fit its own **Work** to that provided under other contracts as may be directed by the **Engineer**. The **Contractor** shall not commit or permit any act which will interfere with the performance of work by any **Other Contractors**.

12.2 If the **Engineer** determines that the **Contractor** is failing to coordinate its **Work** with the work of **Other Contractors** as the **Engineer** has directed, then the **Commissioner** shall have the right to withhold any payments otherwise due hereunder until the **Contractor** completely complies with the **Engineer's** directions.

12.3 The **Contractor** shall notify the **Engineer** in writing if any **Other Contractor** on this **Project** is failing to coordinate its work with the **Work** of this **Contract**. If the **Engineer** finds such charges to be true, the **Engineer** shall promptly issue such directions to the **Other Contractor** with respect thereto as the situation may require. The **City** shall not, however, be liable for any damages suffered by any **Other Contractor's** failure to coordinate its work with the **Work** of this **Contract** or by reason of the **Other Contractor's** failure to promptly comply with the directions so issued by the **Engineer**, or by reason of any **Other Contractor's** default in performance, it being understood that the **City** does not guarantee the responsibility or continued efficiency of any contractor. The **Contractor** agrees to make no claim against the **City** for any damages relating to or arising out of any directions issued by the **Engineer** pursuant to this Article 12 (including but not limited to the failure of any **Other Contractor** to comply or promptly comply with such directions), or the failure of any **Other Contractor** to coordinate its work, or the default in performance of any **Other Contractor**.

12.4 The **Contractor** shall indemnify and hold the **City** harmless from any and all claims or judgments for damages and from costs and expenses to which the **City** may be subjected or which it may suffer or incur by reason of the **Contractor's** failure to comply with the **Engineer's** directions promptly; and the **Comptroller** shall have the right to exercise the powers reserved in Article 23 with respect to any claims which may be made for damages due to the **Contractor's** failure to comply with the **Engineer's** directions promptly. Insofar as the facts and **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent provided by **Law**.

12.5 Should the **Contractor** sustain any damage through any act or omission of any **Other Contractor** having a contract with the **City** for the performance of work upon the **Site** or of work which may be necessary to be performed for the proper prosecution of the **Work** to be performed hereunder, or through any act or omission of a subcontractor of such **Other Contractor**, the **Contractor** shall have no claim against the **City** for such damage, but shall have a right to recover such damage from the **Other**

12.5 **Contractor** under the provision similar to the following provisions which apply to this Contract and have been or will be inserted in the contracts with such Other Contractors:

> 12.5.1 Should any **Other Contractor** having or who shall hereafter have a contract with the **City** for the performance of work upon the **Site** sustain any damage through any act or omission of the **Contractor** hereunder or through any act or omission of any **Subcontractor** of the **Contractor**, the **Contractor** agrees to reimburse such **Other Contractor** for all such damages and to defend at its own expense any action based upon such claim and if any judgment or claim (even if the allegations of the action are without merit) against the **City** shall be allowed the **Contractor** shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and agrees to indemnify and hold the **City** harmless from all such claims. Insofar as the facts and **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent provided by **Law**.

12.6 The **City's** right to indemnification hereunder shall in no way be diminished, waived or discharged by its recourse to assessment of liquidated damages as provided in Article 15, or by the exercise of any other remedy provided for by **Contract** or by **Law**.

ARTICLE 13. EXTENSION OF TIME FOR PERFORMANCE

13.1 If performance by the **Contractor** is delayed for a reason set forth in Article 13.3, the **Contractor** may be allowed a reasonable extension of time in conformance with this Article 13 and the **PPB**

Rules.

13.2 Any extension of time may be granted only by the **ACCO** or by the Board for the Extension of Time (hereafter "Board") (as set forth below) upon written application by the **Contractor**.

13.3 Grounds for Extension: If such application is made, the **Contractor** shall be entitled to an extension of time for delay in completion of the **Work** caused solely:

13.3.1 By the acts or omissions of the **City**, its officials, agents or employees; or

13.3.2 By the act or omissions of **Other Contractors** on this **Project**; or

13.3.3 By supervening conditions entirely beyond the control of either party hereto (such as, but not limited to, acts of God or the public enemy, excessive inclement weather, war or other national emergency making performance temporarily impossible or illegal, or strikes or labor disputes not brought about by any act or omission of the **Contractor**).

13.3.4 The **Contractor** shall, however, be entitled to an extension of time for such causes only for the number of **Days** of delay which the **ACCO** or the Board may determine to be due solely to such causes, and then only if the **Contractor** shall have strictly complied with all of the requirements of Articles 9 and 10.

13.4 The **Contractor** shall not be entitled to receive a separate extension of time for each of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the **Work** as determined by the **ACCO** or the Board, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the **Contractor** or of its **Subcontractors** or **Materialmen**, and would of itself (irrespective of the concurrent causes) have delayed the **Work**, no extension of time will be allowed for the period ofdelay resulting from such act, fault or omission.

13.5 The determination made by the **ACCO** or the Board on an application for an extension of time shall be binding and conclusive on the **Contractor**.

13.6 The **ACCO** or the Board acting entirely within their discretion may grant an application for an extension of time for causes of delay other than those herein referred.

13.7 Permitting the **Contractor** to continue with the **Work** after the time fixed for its completion has expired, or after the time to which such completion may have been extended has expired, or the making of any payment to the **Contractor** after such time, shall in no way operate as a waiver on the part of the **City** of any of its rights under this **Contract**.

13.8 Application for Extension of Time:

13.8.1 Before the **Contractor's** time extension request will be considered, the **Contractor** shall notify the **ACCO** of the condition which allegedly has caused or is causing the delay, and shall submit a written application to the **ACCO** identifying:

13.8.1(a) The **Contractor**; the registration number; and **Project** description;

13.8.1(b) Liquidated damage assessment rate, as specified in the **Contract**;

13.8.1(c) Original total bid price;

13.8.1(d) The original **Contract** start date and completion date;

13.8.1(e) Any previous time extensions granted (number and duration); and

13.8.1(f) The extension of time requested.

13.8.2 In addition, the application for extension of time shall set forth in detail:

13.8.2(a) The nature of each alleged cause of delay in completing the **Work**;

13.8.2(b) The date upon which each such cause of delay began and ended and the number of **Days** attributable to each such cause;

13.8.2(c) A statement that the **Contractor** waives all claims except for those delineated in the application, and the particulars of any claims which the **Contractor** does not agree to waive. For time extensions for **Substantial Completion** and final completion payments, the application shall include a detailed statement of the dollar amounts of each element of claim item reserved; and

13.8.2(d) A statement indicating the **Contractor's** understanding that the time extension is granted only for purposes of permitting continuation of **Contract** performance and payment for **Work** performed and that the **City** retains its right to conduct an investigation and assess liquidated damages as appropriate in the future.

13.9 Analysis and Approval of Time Extensions:

13.9.1 For time extensions for partial payments, a written determination shall be made by the **ACCO** who may, for good and sufficient cause, extend the time for the performance of the **Contract** as follows:

13.9.1(a) If the **Work** is to be completed within six (6) months, the time for performance may be extended for sixty (60) **Days**;

13.9.1(b) If the **Work** is to be completed within less than one (1) year but more than six (6) months, an extension of ninety (90) **Days** may be granted;

13.9.1(c) If the **Contract** period exceeds one (1) year, besides the extension granted in Article 13.9.1(b), an additional thirty (30) **Days** may be granted for each multipleof six (6) months involved beyond the one (1) year period; or

13.9.1(d) If exceptional circumstances exist, the **ACCO** may extend the time for performance beyond the extensions in Articles 13.9.1(a), 13.9.1(b), and 13.9.1(c). In that event, the **ACCO** shall file with the Mayor's Office of Contract Services a written explanation of the exceptional circumstances.

13.9.2 For extensions of time for **Substantial Completion** and final completion payments, the **Engineer**, in consultation with the **ACCO**, shall prepare a written analysis of the delay (including a preliminary determination of the causes of delay, the beginning and end dates for each such cause of delay, and whether the delays are excusable under the terms of this **Contract**). The report shall be subject to review by and approval of the Board, which shall have authority to question its analysis and determinations and request additional facts or documentation. The report as reviewed and made final by the Board shall be made a part of the **Agency** contract file. Neither the report itself nor anything contained therein shall operate as a

waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

13.9.3 Approval Mechanism for Time Extensions for **Substantial Completion** or Final Completion Payments: An extension shall be granted only with the approval of the Board which is comprised of the **ACCO** of the **Agency**, the **City** Corporation Counsel, and the **Comptroller**, or their authorized representatives.

13.9.4 Neither the granting of any application for an extension of time to the **Contractor** or any **Other Contractor** on this **Project** nor the papers, records or reports related to any application for or grant of an extension of time or determination related thereto shall be referred to or offered in evidence by the **Contractor** or its attorneys in any action or proceeding.

13.10 No Damage for Delay: The **Contractor** agrees to make no claim for damages for delay in the performance of this **Contract** occasioned by any act or omission to act of the **City** or any of its representatives, except as provided for in Article 11.

ARTICLE 14. COMPLETION AND FINAL ACCEPTANCE OF THE WORK

14.1 Date for **Substantial Completion**: The **Contractor** shall substantially complete the **Work** within the time fixed in Schedule A of the General Conditions, or within the time to which such **Substantial Completion** may be extended.

14.2 Determining the Date of **Substantial Completion**: The **Work** will be deemed to be substantially complete when the two conditions set forth below have been met.

14.2.1 Inspection: The **Engineer** or **Resident Engineer**, as applicable, has inspected the **Work** and has made a written determination that it is substantially complete.

14.2.2 Approval of **Final Approved Punch List** and Date for **Final Acceptance**: Following inspection of the **Work**, the **Engineer/Resident Engineer** shall furnish the **Contractor** with a final punch list, specifying all items of **Work** to be completed and proposing dates for the completion of each specified item of **Work**. The **Contractor** shall then submit in writing to the **Engineer/Resident Engineer** within ten (10) **Days** of the **Engineer/Resident Engineer** furnishing the final punch list either acceptance of the dates or proposed alternative dates for the completion of each specified item of **Work**. If the **Contractor** neither accepts the dates nor proposes alternative dates within ten (10) **Days**, the schedule proposed by the **Engineer/Resident Engineer** shall be deemed accepted. If the **Contractor** proposes alternative dates, then, within a reasonable time after receipt, the **Engineer/Resident Engineer**, in a written notification to the **Contractor**, shall approve the **Contractor's** completion dates or, if they are unable to agree, the **Engineer/Resident Engineer** shall establish dates for the completion of each item of **Work**. The latest completion date specified shall be the date for **Final Acceptance** of the **Work**.

14.3 Date of **Substantial Completion**. The date of approval of the **Final Approved Punch List**, shall be the date of **Substantial Completion**. The date of approval of the **Final Approved Punch List** shall be either (a) if the **Contractor** approves the final punch list and proposed dates for completion furnished by the **Engineer/Resident Engineer**, the date of the **Contractor**'s approval; or (b) if the **Contractor** neither accepts the dates nor proposes alternative dates, ten (10) **Days** after the **Engineer/Resident Engineer** furnishes the **Contractor** with a final punch list and proposed dates for completion; or (c) if the **Contractor** proposes alternative dates, the date that the **Engineer/Resident Engineer** sends written notification to the

Contractor either approving the **Contractor**'s proposed alternative dates or establishing dates for the completion for each item of **Work**.

14.4 Determining the Date of **Final Acceptance**: The **Work** will be accepted as final and complete as of the date of the **Engineer**'s/**Resident Engineer**'s inspection if, upon such inspection, the **Engineer/Resident Engineer** finds that all items on the **Final Approved Punch List** are complete andno further **Work** remains to be done. The **Commissioner** will then issue a written determination of **Final Acceptance**.

14.5 Request for Inspection: Inspection of the **Work** by the **Engineer/Resident Engineer** for the purpose of **Substantial Completion** or **Final Acceptance** shall be made within fourteen (14) **Days** after receipt of the **Contractor's** written request therefor.

14.6 Request for Re-inspection: If upon inspection for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** determines that there are items of **Work** still to be performed, the **Contractor** shall promptly perform them and then request a re-inspection. If upon re-inspection, the **Engineer/Resident Engineer** determines that the **Work** is substantially complete or finally accepted, the date of such re-inspection shall be the date of **Substantial Completion** or **Final Acceptance**. Re-inspection by the **Engineer/Resident Engineer** shall be made within ten (10) **Days** after receipt of the **Contractor's** written request therefor.

14.7 Initiation of Inspection by the **Engineer/Resident Engineer**: If the **Contractor** does not request inspection or re-inspection of the **Work** for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** may initiate such inspection or re-inspection.

ARTICLE 15. LIQUIDATED DAMAGES

15.1 In the event the **Contractor** fails to substantially complete the **Work** within the time fixed for such **Substantial Completion** in Schedule A of the General Conditions, plus authorized time extensions, or if the **Contractor**, in the sole determination of the **Commissioner**, has abandoned the **Work**, the **Contractor** shall pay to the **City** the sum fixed in Schedule A of the General Conditions, for each and every **Day** that the time consumed in substantially completing the **Work** exceeds the time allowed therefor; which said sum, in view of the difficulty of accurately ascertaining the loss which the **City** will suffer by reason of delay in the **Substantial Completion** of the **Work** hereunder, is hereby fixed and agreed as the liquidated damages that the **City** will suffer by reason of such delay, and not as a penalty. This Article 15 shall also apply to the **Contractor** whether or not the **Contractor** is defaulted pursuant to Chapter X of this **Contract**. Neither the failure to assess liquidated damages nor the granting of any time extension shall operate as a waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

15.2 Liquidated damages received hereunder are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the **City's** right to indemnification, or the **Contractor's** obligation to indemnify the **City**, or to any other remedy provided for in this **Contract** or by **Law**.

15.3 The **Commissioner** may deduct and retain out of the monies which may become due hereunder, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the **City**, the **Contractor** shall be liable to pay the difference.

ARTICLE 16. OCCUPATION OR USE PRIOR TO COMPLETION

16.1 Unless otherwise provided for in the **Specifications**, the **Commissioner** may take over, use, occupy or operate any part of the **Work** at any time prior to **Final Acceptance**, upon written notification to the **Contractor**. The **Engineer** or **Resident Engineer**, as applicable, shall inspect the part of the**Work** to be taken over, used, occupied, or operated, and will furnish the **Contractor** with a written statement of the **Work**, if any, which remains to be performed on such part. The **Contractor** shall not object to, nor interfere with, the **Commissioner's** decision to exercise the rights granted by Article 16. In the event the **Commissioner** takes over, uses, occupies, or operates any part of the **Work:**

16.1.1 the **Engineer/Resident Engineer** shall issue a written determination of **Substantial Completion** with respect to such part of the **Work**;

16.1.2 the **Contractor** shall be relieved of its absolute obligation to protect such part of the unfinished **Work** in accordance with Article 7;

16.1.3 the **Contractor's** guarantee on such part of the **Work** shall begin on the date of such use by the **City**; and;

16.1.4 the **Contractor** shall be entitled to a return of so much of the amount retained in accordance with Article 21 as it relates to such part of the **Work**, except so much thereof as may be retained under Articles 24 and 44.

CHAPTER IV: SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 17. SUBCONTRACTS

17.1 The **Contractor** shall not make subcontracts totaling an amount more than the percentage of the total **Contract** price fixed in Schedule A of the General Conditions, without prior written permission from the **Commissioner**. All subcontracts made by the **Contractor** shall be in writing. No **Work** may be performed by a **Subcontractor** prior to the **Contractor** entering into a written subcontract with the **Subcontractor** and complying with the provisions of this Article 17.

17.2 Before making any subcontracts, the **Contractor** shall submit a written statement to the **Commissioner** giving the name and address of the proposed **Subcontractor**; the portion of the **Work** and materials which it is to perform and furnish; the cost of the subcontract; the VENDEX questionnaire if required; the proposed subcontract if requested by the **Commissioner**; and any other information tending to prove that the proposed **Subcontractor** has the necessary facilities, skill, integrity, past experience, and financial resources to perform the **Work** in accordance with the terms and conditions of this **Contract**.

17.3 In addition to the requirements in Article 17.2, **Contractor** is required to list the **Subcontractor** in the web based Subcontractor Reporting System through the City's Payee Information Portal (PIP), available at www.nyc.gov/pip.[1]For each **Subcontractor** listed, **Contractor** is required to provide the following information: maximum contract value, description of **Subcontractor's** Work, start and end date of the subcontract and identification of the **Subcontractor**'s industry. Thereafter, **Contractor** will be required to report in the system the payments made to each **Subcontractor** within 30 days of making the

[1] In order to use the new system, a PIP account will be required. Detailed instructions on creating a PIP account and using the new system are also available at www.nyc.gov/pip. Additional assistance with PIP may be obtained by emailing the Financial Information Services Agency Help Desk at pip@fisa.nyc.gov.

payment. If any of the required information changes throughout the Term of the **Contract**, **Contractor** will be required to revise the information in the system.

Failure of the **Contractor** to list a **Subcontractor** and/or to report **Subcontractor** payments in a timely fashion may result in the **Commissioner** declaring the **Contractor** in default of the **Contract** and will subject **Contractor** to liquidated damages in the amount of $100 per day for each day that the **Contractor** fails to identify a **Subcontractor** along with the required information about the **Subcontractor** and/or fails to report payments to a **Subcontractor**, beyond the time frames set forth herein or in the notice from the **City**. Article 15 shall govern the issue of liquidated damages.

17.4 If an approved **Subcontractor** elects to subcontract any portion of its subcontract, the proposed sub-subcontract shall be submitted in the same manner as directed above.

17.5 The **Commissioner** will notify the **Contractor** in writing whether the proposed **Subcontractor** is approved. If the proposed **Subcontractor** is not approved, the **Contractor** may submit another proposed **Subcontractor** unless the **Contractor** decides to do the **Work**. No **Subcontractor** shall be permitted to enter or perform any work on the **Site** unless approved.

17.6 Before entering into any subcontract hereunder, the **Contractor** shall provide the proposed **Subcontractor** with a complete copy of this document and inform the proposed **Subcontractor** fully and completely of all provisions and requirements of this **Contract** relating either directly or indirectly to the **Work** to be performed and the materials to be furnished under such subcontract, and every such **Subcontractor** shall expressly stipulate that all labor performed and materials furnished by the **Subcontractor** shall strictly comply with the requirements of this **Contract.**

17.7 Documents given to a prospective **Subcontractor** for the purpose of soliciting the **Subcontractor's** bid shall include either a copy of the bid cover or a separate information sheet setting forth the **Project** name, the **Contract** number (if available), the **Agency** (as noted in Article 2.1.6), and the **Project's** location.

17.8 The **Commissioner's** approval of a **Subcontractor** shall not relieve the **Contractor** of any of its responsibilities, duties, and liabilities hereunder. The **Contractor** shall be solely responsible to the **City** for the acts or defaults of its **Subcontractor** and of such **Subcontractor's** officers, agents, and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the **Contractor** to the extent of its subcontract.

17.9 If the **Subcontractor** fails to maintain the necessary facilities, skill, integrity, past experience, and financial resources (other than due to the **Contractor's** failure to make payments where required) to perform the **Work** in accordance with the terms and conditions of this **Contract**, the **Contractor** shall promptly notify the **Commissioner** and replace such **Subcontractor** with a newly approved **Subcontractor** in accordance with this Article 17.

17.10 The **Contractor** shall be responsible for ensuring that all **Subcontractors** performing **Work** at the **Site** maintain all insurance required by **Law**.

17.11 The **Contractor** shall promptly, upon request, file with the **Engineer** a conformed copy of the subcontract and its cost. The subcontract shall provide the following:

17.11.1 Payment to **Subcontractors**: The agreement between the **Contractor** and its **Subcontractor** shall contain the same terms and conditions as to method of payment for **Work**, labor, and materials, and as to retained percentages, as are contained in this **Contract**.

17.11.2 Prevailing Rate of Wages: The agreement between the **Contractor** and its **Subcontractor** shall include the prevailing wage rates and supplemental benefits to be paid in accordance with Labor Law Section 220.

17.11.3 Section 6-123 of the Administrative Code: Pursuant to the requirements of Section 6-123 of the Administrative Code, every agreement between the **Contractor** and a **Subcontractor** in excess of fifty thousand ($50,000) dollars shall include a provision that the **Subcontractor** shall not engage in any unlawful discriminatory practice as defined in Title VIII of the Administrative Code (Section 8-101 *et seq*.).

17.11.4 All requirements required pursuant to federal and/or state grant agreement(s), if applicable to the **Work**.

17.12 The **Commissioner** may deduct from the amounts certified under this **Contract** to be due to the **Contractor**, the sum or sums due and owing from the **Contractor** to the **Subcontractors** according to the terms of the said subcontracts, and in case of dispute between the **Contractor** and its **Subcontractor**, or **Subcontractors**, as to the amount due and owing, the **Commissioner** may deduct and withhold from the amounts certified under this **Contract** to be due to the **Contractor** such sum or sums as may be claimed by such **Subcontractor**, or **Subcontractors**, in a sworn affidavit, to be due and owing until such time as such claim or claims shall have been finally resolved.

17.13 On contracts where performance bonds and payment bonds are executed, the **Contractor** shall include on each requisition for payment the following data: **Subcontractor's** name, value of the subcontract, total amount previously paid to **Subcontractor** for **Work** previously requisitioned, and the amount, including retainage, to be paid to the **Subcontractor** for **Work** included in the requisition.

17.14 On **Contracts** where performance bonds and payment bonds are not executed, the **Contractor** shall include with each requisition for payment submitted hereunder, a signed statement from each and every **Subcontractor** and/or **Materialman** for whom payment is requested in such requisition. Such signed statement shall be on the letterhead of the **Subcontractor** and/or **Materialman** for whom payment is requested and shall (i) verify that such **Subcontractor** and/or **Materialman** has been paid in full for all **Work** performed and/or material supplied to date, exclusive of any amount retained and any amount included on the current requisition, and (ii) state the total amount of retainage to date, exclusive of any amount retained on the current requisition.

ARTICLE 18. ASSIGNMENTS

18.1 The **Contractor** shall not assign, transfer, convey or otherwise dispose of this **Contract**, or the right to execute it, or the right, title or interest in or to it or any part thereof, or assign, by power of attorney or otherwise any of the monies due or to become due under this **Contract**, unless the previous written consent of the **Commissioner** shall first be obtained thereto, and the giving of any such consent to a particular assignment shall not dispense with the necessity of such consent to any further or other assignments.

18.2 Such assignment, transfer, conveyance or other disposition of this **Contract** shall not be valid until filed in the office of the **Commissioner** and the **Comptroller**, with the written consent of the **Commissioner** endorsed thereon or attached thereto.

18.3 Failure to obtain the previous written consent of the **Commissioner** to such an assignment,

transfer, conveyance or other disposition, may result in the revocation and annulment of this **Contract**. The **City** shall thereupon be relieved and discharged from any further liability to the **Contractor**, its assignees, transferees or sublessees, who shall forfeit and lose all monies therefor earned under the **Contract**, except so much as may be required to pay the **Contractor's** employees.

18.4 The provisions of this clause shall not hinder, prevent, or affect an assignment by the **Contractor** for the benefit of its creditors made pursuant to the **Laws** of the State of New York.

18.5 This **Contract** may be assigned by the **City** to any corporation, agency or instrumentality having authority to accept such assignment.

CHAPTER V: CONTRACTOR'S SECURITY AND GUARANTEE

ARTICLE 19. SECURITY DEPOSIT

19.1 If performance and payment bonds are required, the **City** shall retain the bid security to ensure that the successful bidder executes the **Contract** and furnishes the required payment and performance security within ten (10) **Days** after notice of the award of the **Contract**. If the successful bidder fails to execute the **Contract** and furnish the required payment and performance security, the **City** shall retain such bid security as set forth in the Information for Bidders. If the successful bidder executes the **Contract** and furnishes the required payment and performance security, the **City** shall return the bid security within a reasonable time after the furnishing of such bonds and execution of the **Contract** by the **City**.

19.2 If performance and payment bonds are not required, the bid security shall be retained by the **City** as security for the **Contractor**'s faithful performance of the **Contract**. If partial payments are provided, the bid security will be returned to the **Contractor** after the sum retained under Article 21 equals the amount of the bid security, subject to other provisions of this **Contract**. If partial payments are not provided, the bid security will be released when final payment is certified by the **City** for payment.

19.3 If the **Contractor** is declared in default under Article 48 prior to the return of the deposit, or if any claim is made such as referred to in Article 23, the amount of such deposit, or so much thereof as the **Comptroller** may deem necessary, may be retained and then applied by the **Comptroller**:

19.3.1 To compensate the **City** for any expense, loss or damage suffered or incurred by reason of or resulting from such default, including the cost of re-letting and liquidated damages; or

19.3.2 To indemnify the **City** against any and all claims.

ARTICLE 20. PAYMENT GUARANTEE

20.1 On **Contracts** where one hundred (100%) percent performance bonds and payment bonds are executed, this Article 20 does not apply.

20.2 In the event the terms of this **Contract** do not require the **Contractor** to provide a payment bond or where the **Contract** does not require a payment bond for one hundred (100%) percent of the **Contract** price, the **City** shall, in accordance with the terms of this Article 20, guarantee payment of all lawful claims for:

20.2.1 Wages and compensation for labor performed and/or services rendered; and

20.2.2 Materials, equipment, and supplies provided, whether incorporated into the **Work** or not, when demands have been filed with the **City** as provided hereinafter by any person, firm, or corporation which furnished labor, material, equipment, supplies, or any combination thereof, in connection with the **Work** performed hereunder (hereinafter referred to as the "beneficiary") at the direction of the **City** or the **Contractor**.

20.3 The provisions of Article 20.2 are subject to the following limitations and conditions:

20.3.1 If the **Contractor** provides a payment bond for a value that is less than one hundred (100%) percent of the value of the **Contract Work**, the payment bond provided by the **Contractor** shall be primary (and non-contributing) to the payment guarantee provided under this Article 20.

20.3.2 The guarantee is made for the benefit of all beneficiaries as defined in Article 20.2 provided that those beneficiaries strictly adhere to the terms and conditions of Article 20.3.4 and 20.3.5.

20.3.3 Nothing in this Article 20 shall prevent a beneficiary providing labor, services or material for the **Work** from suing the **Contractor** for any amounts due and owing the beneficiary by the **Contractor**.

20.3.4 Every person who has furnished labor or material, to the **Contractor** or to a **Subcontractor** of the **Contractor**, in the prosecution of the **Work** and who has not been paid in full therefor before the expiration of a period of ninety (90) **Days** after the date on which the last of the labor was performed or material was furnished by him/her for which the claim is made, shall have the right to sue on this payment guarantee in his/her own name for the amount, or the balance thereof, unpaid at the time of commencement of the action; provided, however, that a person having a direct contractual relationship with a **Subcontractor** of the **Contractor** but no contractual relationship express or implied with the **Contractor** shall not have a right of action upon the guarantee unless he/she shall have given written notice to the **Contractor** within one hundred twenty (120) **Days** from the date on which the last of the labor was performed or the last of the material was furnished, for which his/her claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the material was furnished or for whom the labor was performed. The notice shall be served by delivering the same personally to the **Contractor** or by mailing the same by registered mail, postage prepaid, in an envelope addressed to the **Contractor** at any place where it maintains an office or conducts its business; provided, however, that where such notice is actually received by the **Contractor** by other means,such notice shall be deemed sufficient.

20.3.5 Except as provided in Labor Law Section 220-g, no action on this payment guarantee shall be commenced after the expiration of the one-year limitations period set forth in Section 137(4)(b) of the State Finance Law.

20.3.6 The **Contractor** shall promptly forward to the **City** any notice or demand received pursuant to Article 20.3.4. The **Contractor** shall inform the **City** of any defenses to the notice or demand and shall forward to the **City** any documents the **City** requests concerning the notice or demand.

20.3.7 All demands made against the **City** by a beneficiary of this payment guarantee shall be presented to the **Engineer** along with all written documentation concerning the demand which the **Engineer** deems reasonably appropriate or necessary, which may include, but shall not be

limited to: the subcontract; any invoices presented to the **Contractor** for payment; the notarized statement of the beneficiary that the demand is due and payable, that a request for payment has been made of the **Contractor** and that the demand has not been paid by the **Contractor** within the time allowed for such payment by the subcontract; and copies of any correspondence between the beneficiary and the **Contractor** concerning such demand. The **City** shall notify the **Contractor** that a demand has been made. The **Contractor** shall inform the **City** of any defenses to the demand and shall forward to the **City** any documents the **City** requests concerning the demand.

20.3.8 The **City** shall make payment only if, after considering all defenses presented by the **Contractor**, it determines that the payment is due and owing to the beneficiary making the demand.

20.3.9 No beneficiary shall be entitled to interest from the **City**, or to any other costs, including, but not limited to, attorneys' fees, except to the extent required by State Finance Law Section 137.

20.3.10

20.4 Upon the receipt by the **City** of a demand pursuant to this Article 20, the **City** may withhold from any payment otherwise due and owing to the **Contractor** under this **Contract** an amount sufficient to satisfy the demand.

20.4.1 In the event the **City** determines that the demand is valid, the **City** shall notify the **Contractor** of such determination and the amount thereof and direct the **Contractor** to immediately pay such amount to the beneficiary. In the event the **Contractor**, within seven (7) **Days** of receipt of such notification from the **City**, fails to pay the beneficiary, such failure shall constitute an automatic and irrevocable assignment of payment by the **Contractor** to the beneficiary for the amount of the demand determined by the **City** to be valid. The **Contractor**, without further notification or other process, hereby gives its unconditional consent to such assignment of payment to the beneficiary and authorizes the **City**, on its behalf, to take all necessary actions to implement such assignment of payment, including without limitation the execution of any instrument or documentation necessary to effectuate such assignment.

20.4.2 In the event that the amount otherwise due and owing to the **Contractor** by the **City** is insufficient to satisfy such demand, the **City** may, at its option, require payment from the **Contractor** of an amount sufficient to cover such demand and exercise any other right to require or recover payment which the **City** may have under **Law** or **Contract**.

20.4.3 In the event the **City** determines that the demand is invalid, any amount withheld pending the **City**'s review of such demand shall be paid to the **Contractor**; provided, however, no lien has been filed. In the event a claim or an action has been filed, the terms and conditions set forth in Article 23 shall apply. In the event a lien has been filed, the parties will be governed by the provisions of the Lien Law of the State of New York.

20.5 The provisions of this Article 20 shall not prevent the **City** and the **Contractor** from resolving disputes in accordance with the **PPB** Rules, where applicable.

20.6 In the event the **City** determines that the beneficiary is entitled to payment pursuant to this Article 20, such determination and any defenses and counterclaims raised by the **Contractor** shall be taken into account in evaluating the **Contractor's** performance.

20.7 Nothing in this Article 20 shall relieve the **Contractor** of the obligation to pay the claims of all

persons with valid and lawful claims against the **Contractor** relating to the **Work**.

20.8 The **Contractor** shall not require any performance, payment or other bonds of any **Subcontractor** if this **Contract** does not require such bonds of the **Contractor**.

20.9 The payment guarantee made pursuant to this Article 20 shall be construed in a manner consistent with Section 137 of the State Finance Law and shall afford to persons furnishing labor or materials to the **Contractor** or its **Subcontractors** in the prosecution of the **Work** under this **Contract** all of the rights and remedies afforded to such persons by such section, including but not limited to, the right to commence an action against the **City** on the payment guarantee provided by this Article 20 within the one-year limitations period set forth in Section 137(4)(b).

ARTICLE 21. RETAINED PERCENTAGE

21.1 If this **Contract** requires one hundred (100%) percent performance and payment security, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.2 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded does not exceed one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.3 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded exceeds one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract,** the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, up to ten (10%) percent of the value of **Work** certified for payment in each partial payment voucher. The percentage to be retained is set forth in Schedule A of the General Conditions.

ARTICLE 22. INSURANCE

22.1 Types of Insurance: The **Contractor** shall procure and maintain the following types of insurance if, and as indicated, in Schedule A of the General Conditions (with the minimum limits and special conditions specified in Schedule A). Such insurance shall be maintained from the date the **Contractor** is required to provide Proof of Insurance pursuant to Article 22.3.1 through the date of completion of all required **Work** (including punch list work as certified in writing by the **Resident Engineer**), except for insurance required pursuant to Article 22.1.4, which may terminate upon **Substantial Completion** of the **Contract**. All insurance shall meet the requirements set forth in this Article 22. Wherever this Article requires that insurance coverage be "at least as broad" as a specified form (including all ISO forms), there is no obligation that the form itself be used, provided that the **Contractor** can demonstrate that the alternative form or endorsement contained in its policy provides coverage at least as broad as the specified form.

22.1.1 Commercial General Liability Insurance: The **Contractor** shall provide Commercial General Liability Insurance covering claims for property damage and/or bodily injury, including death, which may arise from any of the operations under this **Contract**. Coverage under this insurance shall be at least as broad as that provided by the latest edition of Insurance

Services Office ("ISO") Form CG 0001. Such insurance shall be "occurrence" based rather than "claims-made" and include, without limitation, the following types of coverage: premises operations; products and completed operations; contractual liability (including the tort liability of another assumed in a contract); broad form property damage; independent contractors; explosion, collapse and underground (XCU); construction means and methods; and incidental malpractice. Such insurance shall contain a "per project" aggregate limit, as specified in Schedule A, that applies separately to operations under this **Contract**.

22.1.1(a) Such Commercial General Liability Insurance shall name the **City** as an Additional Insured. Coverage for the City shall specifically include the **City's** officials and employees, be at least as broad as the latest edition of ISO Form CG 20 10 and provide completed operations coverage at least as broad as the latest edition of ISO Form CG 20 37.

22.1.1(b) Such Commercial General Liability Insurance shall name all other entities designated as additional insureds in Schedule A but only for claims arising from the **Contractor's** operations under this **Contract**, with coverage at least as broad as the latest edition of ISO Form CG 20 26.

22.1.1(c) If the **Work** requires a permit from the Department of Buildings pursuant to 1 RCNY Section 101-08, the **Contractor** shall provide Commercial General Liability Insurance with limits of at least those required by 1 RCNY section 101-08 or greater limits required by the Agency in accordance with Schedule A. If the **Work** does not require such a permit, the minimum limits shall be those provided for in Schedule A.

22.1.1(d) If any of the **Work** includes repair of a waterborne vessel owned by or to be delivered to the **City**, such Commercial General Liability shall include, or be endorsed to include, Ship Repairer's Legal Liability Coverage to protect against, without limitation, liability arising from navigation of such vessels prior to delivery to and acceptance by the **City**.

22.1.2 Workers' Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance: The **Contractor** shall provide, and shall cause its **Subcontractors** to provide, Workers Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance in accordance with the **Laws** of the State of New York on behalf of all employees providing services under this **Contract** (except for those employees, if any, for which the **Laws** require insurance only pursuant to Article 22.1.3).

22.1.3 United States Longshoremen's and Harbor Workers Act and/or Jones Act Insurance: If specified in Schedule A of the General Conditions or if required by **Law**, the **Contractor** shall provide insurance in accordance with the United States Longshoremen's and Harbor Workers Act and/or the Jones Act, on behalf of all qualifying employees providing services under this **Contract**.

22.1.4 Builders Risk Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall provide Builders Risk Insurance on a completed value form for the total value of the **Work** through **Substantial Completion** of the **Work** in its entirety. Such insurance shall be provided on an All Risk basis and include coverage, without limitation, for windstorm (including named windstorm), storm surge, flood and earth movement. Unless waived by the **Commissioner**, it shall include coverage for ordinance and law, demolition and increased costs of construction, debris removal, pollutant clean up and removal, and expediting costs. Such insurance shall cover, without limitation, (a) all buildings and/or structures involved in the

Work, as well as temporary structures at the **Site**, and (b) any property that is intended to become a permanent part of such building or structure, whether such property is on the **Site**, in transit or in temporary storage. Policies shall name the **Contractor** as Named Insured and list the **City** as both an Additional Insuredand a Loss Payee as its interest may appear.

22.1.4(a) Policies of such insurance shall specify that, in the event a loss occurs at an occupied facility, occupancy of such facility is permitted without the consent of the issuing insurance company.

22.1.4(b) Such insurance may be provided through an Installation Floater, at the **Contractor's** option, if it otherwise conforms with the requirements of this Article 22.1.4.

22.1.5 Commercial Automobile Liability Insurance: The **Contractor** shall provide Commercial Automobile Liability Insurance for liability arising out of ownership, maintenance or use of any owned (if any), non-owned and hired vehicles to be used in connection with this **Contract**. Coverage shall be at least as broad as the latest edition of ISO Form CA0001. If vehicles are used for transporting hazardous materials, the Automobile Liability Insurance shall be endorsed to provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90.

22.1.6 Contractors Pollution Liability Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work**to maintain, Contractors Pollution Liability Insurance covering bodily injury and property damage. Such insurance shall provide coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants (including asbestos), including any loss, cost or expense incurred as a result of any cleanup of pollutants (including asbestos) or in the investigation, settlement or defense of any claim, action, or proceedings arising from the operations under this **Contract**. Such insurance shall be in the **Contractor's** name and list the **City** as an Additional Insured and any other entity specified in Schedule A. Coverage shall include, without limitation, (a) loss of use of damaged property or of property that has not been physically injured, (b) transportation, and (c) non- owned disposal sites.

22.1.6(a) Coverage for the **City** as Additional Insured shall specifically include the **City's** officials and employees and be at least as broad as provided to the **Contractor** for this **Project**.

22.1.6(b) If such insurance is written on a claims-made policy, such policy shall have a retroactive date on or before the effective date of this **Contract**, and continuous coverage shall be maintained, or an extended discovery period exercised, for a period of not less than three (3) years from the time the **Work** under this **Contract** is completed.

22.1.7 Marine Insurance:

22.1.7(a) Marine Protection and Indemnity Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the**Subcontractor** doing such Work to maintain, Marine Protection and Indemnity Insurance with coverage at least as broad as Form SP-23. The insurance shall provide coverage for the **Contractor** or **Subcontractor** (whichever is doing this **Work**) and for the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured for bodily injury and property damage arising from marine operations under this

Contract. Coverage shall include, without limitation, injury or death of crew members (if not fully provided through other insurance), removal of wreck, damage to piers, wharves and other fixed or floating objects and loss of or damage to any other vessel or craft, or to property on such other vessel or craft.

22.1.7(b) Hull and Machinery Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Hull and Machinery Insurance with coverage for the **Contractor** or **Subcontractor** (whichever is doing this Work) and for the **City** (together with its officials and employees) as Additional Insured at least as broad as the latest edition of American Institute Tug Form for all tugs used under this **Contract** and Collision Liability at least as broad as the latest edition of American Institute Hull Clauses.

22.1.7(c) Marine Pollution Liability Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such Work to maintain, Marine Pollution Liability Insurance covering itself (or the Subcontractor doing such Work) as Named Insured and the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured. Coverage shall be at least as broad as that provided by the latest edition of Water Quality Insurance Syndicate Form and include, without limitation, liability arising from the discharge or substantial threat of a discharge of oil, or from the release or threatened release of a hazardous substance including injury to, or economic losses resulting from, the destruction of or damage to real property, personal property or natural resources.

22.1.8 The **Contractor** shall provide such other types of insurance, at such minimum limits and with such conditions, as are specified in Schedule A of the General Conditions.

22.2 General Requirements for Insurance Coverage and Policies:

22.2.1 All required insurance policies shall be maintained with companies that may lawfully issue the required policy and have an A.M. Best rating of at least A-/VII or a Standard and Poor's rating of at least A, unless prior written approval is obtained from the **City** Corporation Counsel.

22.2.2 The **Contractor** shall be solely responsible for the payment of all premiums for all required policies and all deductibles and self-insured retentions to which such policies are subject, whether or not the **City** is an insured under the policy.

22.2.3 In his/her sole discretion, the **Commissioner** may, subject to the approval of the **Comptroller** and the **City** Corporation Counsel, accept Letters of Credit and/or custodial accounts in lieu of required insurance.

22.2.4 The **City's** limits of coverage for all types of insurance required pursuant to Schedule A of the General Conditions shall be the greater of (i) the minimum limits set forth in Schedule A or (ii) the limits provided to the **Contractor** as Named Insured under all primary, excess, and umbrella policies of that type of coverage.

22.2.5 The **Contractor** may satisfy its insurance obligations under this Article 22 through primary policies or a combination of primary and excess/umbrella policies, so long as all policies provide the scope of coverage required herein.

22.2.6 Policies of insurance provided pursuant to this Article 22 shall be primary and non-contributing to any insurance or self-insurance maintained by the **City**.

22.3 Proof of Insurance:

22.3.1 For all types of insurance required by Article 22.1 and Schedule A, except for insurance required by Articles 22.1.4 and 22.1.7, the **Contractor** shall file proof of insurance in accordance with this Article 22.3 within ten (10) **Days** of award. For insurance provided pursuant to Articles 22.1.4 and 22.1.7, proof shall be filed by a date specified by the **Commissioner** or ten (10) **Days** prior to the commencement of the portion of the **Work** covered by such policy, whichever is earlier.

22.3.2 For Workers' Compensation Insurance provided pursuant to Article 22.1.2, the **Contractor** shall submit one of the following forms: C-105.2 Certificate of Workers' Compensation Insurance; U-26.3 - State Insurance Fund Certificate of Workers' Compensation Insurance; Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. For Disability Benefits Insurance provided pursuant to Article 22.1.2, the Contractor shall submit DB-120.1 - Certificate Of Insurance Coverage Under The NYS Disability Benefits Law, Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. ACORD forms are not acceptable.

22.3.3 For policies provided pursuant to all of Article 22.1 other than Article 22.1.2, the **Contractor** shall submit one or more Certificates of Insurance on forms acceptable to the **Commissioner**. All such Certificates of Insurance shall certify (a) the issuance and effectiveness of such policies of insurance, each with the specified minimum limits (b) for insurance secured pursuant to Article 22.1.1 that the **City** and any other entity specified in Schedule A is an Additional Insured thereunder; (c) in the event insurance is required pursuant to Article 22.1.6 and/or Article 22.1.7, that the City is an Additional Insured thereunder; (d) the company code issued to the insurance company by the National Association of Insurance Commissioners (the NAIC number); and (e) the number assigned to the **Contract** by the **City**. All such Certificates of Insurance shall be accompanied by either a duly executed "Certification by Insurance Broker or Agent" in the form contained in Part III of Schedule A or copies of all policies referenced in such Certificate of Insurance as certified by an authorized representative of the issuing insurance carrier. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

22.3.4 Documentation confirming renewals of insurance shall be submitted to the **Commissioner** prior to the expiration date of coverage of policies required under this **Contract**. Such proofs of insurance shall comply with the requirements of Articles 22.3.2 and 22.3.3.

22.3.5 The **Contractor** shall be obligated to provide the **City** with a copy of any policy of insurance provided pursuant to this Article 22 upon the demand for such policy by the **Commissioner** or the **City** Corporation Counsel.

22.4 Operations of the **Contractor**:

22.4.1 The **Contractor** shall not commence the **Work** unless and until all required certificates have been submitted to and accepted by the **Commissioner**. Acceptance by the

Commissioner of a certificate does not excuse the **Contractor** from securing insurance consistent with all provisions of this Article 22 or of any liability arising from its failure todo so.

22.4.2 The **Contractor** shall be responsible for providing continuous insurance coverage in the manner, form, and limits required by this **Contract** and shall be authorized to perform **Work** only during the effective period of all required coverage.

22.4.3 In the event that any of the required insurance policies lapse, are revoked, suspended or otherwise terminated, for whatever cause, the **Contractor** shall immediately stop all **Work**, and shall not recommence **Work** until authorized in writing to do so by the **Commissioner**. Upon quitting the **Site**, except as otherwise directed by the **Commissioner**, the **Contractor** shall leave all plant, materials, equipment, tools, and supplies on the **Site**. **Contract** time shall continue to run during such periods and no extensions of time will be granted. The **Commissioner** may also declare the **Contractor** in default for failure to maintain required insurance.

22.4.4 In the event the **Contractor** receives notice, from an insurance company or other person, that any insurance policy required under this Article 22 shall be cancelled or terminated (or has been cancelled or terminated) for any reason, the **Contractor** shall immediately forward a copy of such notice to both the **Commissioner** and the New York City Comptroller, attn: Office of Contract Administration, Municipal Building, One Centre Street, room 1005, New York, New York 10007. Notwithstanding the foregoing, the **Contractor** shall ensure that there is no interruption in any of the insurance coverage required under this Article 22.

22.4.5 Where notice of loss, damage, occurrence, accident, claim or suit is required under an insurance policy maintained in accordance with this Article 22, the **Contractor** shall notify in writing all insurance carriers that issued potentially responsive policies of any such event relating to any operations under this **Contract** (including notice to Commercial General Liability insurance carriers for events relating to the **Contractor**'s own employees) no later than 20 days after such event. For any policy where the **City** is an Additional Insured, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Insured as well as the Named Insured." Such notice shall also contain the following information: the number of the insurance policy, the name of the named insured, the date and location of the damage, occurrence, or accident, and the identity of the persons or things injured, damaged or lost. The **Contractor** shall simultaneously send a copy of such notice to the City of New York c/o Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, New York 10007.

22.4.6 In the event of any loss, accident, claim, action, or other event that does or can give rise to a claim under any insurance policy required under this Article 22, the **Contractor** shall at all times fully cooperate with the **City** with regard to such potential or actual claim.

22.5 **Subcontractor** Insurance: In the event the **Contractor** requires any **Subcontractor** to procure insurance with regard to any operations under this **Contract** and requires such **Subcontractor** to name the **Contractor** as an **Additional Insured** thereunder, the **Contractor** shall ensure that the **Subcontractor** name the **City**, including its officials and employees, as an Additional Insured with coverage at least as broad as the most recent edition of ISO Form CG 20 26.

22.6 Wherever reference is made in Article 7 or this Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents shall be sent to the address set forth in Schedule A of the General Conditions. In the event no address is set forth in Schedule A, such documents

are to be sent to the **Commissioner's** address as provided elsewhere in this **Contract**.

22.7 Apart from damages or losses covered by insurance provided pursuant to Articles 22.1.2, 22.1.3, or 22.1.5, the **Contractor** waives all rights against the **City**, including its officials and employees, for any damages or losses that are covered under any insurance required under this Article 22 (whether or not such insurance is actually procured or claims are paid thereunder) or any other insurance applicableto the operations of the **Contractor** and/or its employees, agents, or **Subcontractors**.

22.8 In the event the **Contractor** utilizes a self-insurance program to satisfy any of the requirements of this Article 22, the **Contractor** shall ensure that any such self-insurance program provides the **City** with all rights that would be provided by traditional insurance under this Article 22, including but not limited to the defense and indemnification obligations that insurers are required to undertake in liability policies.

22.9 Materiality/Non-Waiver: The **Contractor's** failure to secure policies in complete conformity with this Article 22, or to give an insurance company timely notice of any sort required in this **Contract** or to do anything else required by this Article 22 shall constitute a material breach of this **Contract**. Such breach shall not be waived or otherwise excused by any action or inaction by the **City** at any time.

22.10 Pursuant to General Municipal Law Section 108, this **Contract** shall be void and of no effect unless **Contractor** maintains Workers' Compensation Insurance for the term of this **Contract** tothe extent required and in compliance with the New York State Workers' Compensation Law.

22.11 Other Remedies: Insurance coverage provided pursuant to this Article 22 or otherwise shall not relieve the **Contractor** of any liability under this **Contract**, nor shall it preclude the **City** from exercising any rights or taking such other actions available to it under any other provisions of this **Contract** or **Law**.

ARTICLE 23. MONEY RETAINED AGAINST CLAIMS

23.1 If any claim shall be made by any person or entity (including **Other Contractors** with the **City** on this **Project**) against the **City** or against the **Contractor** and the **City** for any of the following:

(a) An alleged loss, damage, injury, theft or vandalism of any of the kinds referred to in Articles 7 and 12, plus the reasonable costs of defending the **City**, which in the opinion of the **Comptroller** may not be paid by an insurance company (for any reason whatsoever);or

(b) An infringement of copyrights, patents or use of patented articles, tools, etc., asreferred to in Article 57; or

(c) Damage claimed to have been caused directly or indirectly by the failure of the **Contractor** to perform the **Work** in strict accordance with this **Contract,**

the amount of such claim, or so much thereof as the **Comptroller** may deem necessary, may be withheld by the **Comptroller**, as security against such claim, from any money due hereunder. The **Comptroller**, in his/her discretion, may permit the **Contractor** to substitute other satisfactory security in lieu of the monies so withheld.

23.2 If an action on such claim is timely commenced and the liability of the **City**, or the **Contractor**,

or both, shall have been established therein by a final judgment of a court of competent jurisdiction, or if such claim shall have been admitted by the **Contractor** to be valid, the **Comptroller** shall pay such judgment or admitted claim out of the monies retained by the **Comptroller** under the provisions of this Article 23, and return the balance, if any, without interest, to the **Contractor**.

ARTICLE 24. MAINTENANCE AND GUARANTY

24.1 The **Contractor** shall promptly repair, replace, restore or rebuild, as the **Commissioner** may determine, any finished **Work** in which defects of materials or workmanship may appear or to which damage may occur because of such defects, during the one (1) year period subsequent to the date of **Substantial Completion** (or use and occupancy in accordance with Article 16), except where other periods of maintenance and guaranty are provided for in Schedule A.

24.2 As security for the faithful performance of its obligations hereunder, the **Contractor**, upon filing its requisition for payment on **Substantial Completion**, shall deposit with the **Commissioner** a sum equal to one (1%) percent of the price (or the amount fixed in Schedule A of the General Conditions) in cash or certified check upon a state or national bank and trust company or a check of such bank and trust company signed by a duly authorized officer thereof and drawn to the order of the **Comptroller**, or obligations of the **City**, which the **Comptroller** may approve as of equal value with the sum so required.

24.3 In lieu of the above, the **Contractor** may make such security payment to the **City** byauthorizing the **Commissioner** in writing to deduct the amount from the **Substantial Completion** payment which shall be deemed the deposit required above.

24.4 If the **Contractor** has faithfully performed all of its obligations hereunder the **Commissioner** shall so certify to the **Comptroller** within five (5) **Days** after the expiration of one (1) year from the date of **Substantial Completion** and acceptance of the **Work** or within thirty (30) **Days** after the expirationof the guarantee period fixed in the **Specifications**. The security payment shall be repaid to the **Contractor** without interest within thirty (30) **Days** after certification by the **Commissioner** to the **Comptroller** that the **Contractor** has faithfully performed all of its obligations hereunder.

24.5 Notice by the **Commissioner** to the **Contractor** to repair, replace, rebuild or restore such defective or damaged **Work** shall be timely, pursuant to this article, if given not later than ten (10) **Days** subsequent to the expiration of the one (1) year period or other periods provided for herein.

24.6 If the **Contractor** shall fail to repair, replace, rebuild or restore such defective or damaged **Work** promptly after receiving such notice, the **Commissioner** shall have the right to have the **Work** done by others in the same manner as provided for in the completion of a defaulted **Contract**, under Article 51.

24.7 If the security payment so deposited is insufficient to cover the cost of such **Work**, the **Contractor** shall be liable to pay such deficiency on demand by the **Commissioner**.

24.8 The **Engineer's** certificate setting forth the fair and reasonable cost of repairing, replacing, rebuilding or restoring any damaged or defective **Work** when performed by one other than the **Contractor**, shall be binding and conclusive upon the **Contractor** as to the amount thereof.

24.9 The **Contractor** shall obtain all manufacturers' warranties and guaranties of all equipment and materials required by this **Contract** in the name of the **City** and shall deliver same to the **Commissioner**. All of the **City's** rights and title and interest in and to said manufacturers' warranties and guaranties may be assigned by the **City** to any subsequent purchasers of such equipment and materials or lessees of the

premises into which the equipment and materials have been installed.

CHAPTER VI: CHANGES, EXTRA WORK, AND DOCUMENTATION OF CLAIM

ARTICLE 25. CHANGES

25.1 Changes may be made to this **Contract** only as duly authorized in writing by the **Commissioner** in accordance with the **Law** and this **Contract**. All such changes, modifications, and amendments will become a part of the **Contract**. **Work** so ordered shall be performed by the **Contractor**.

25.2 **Contract** changes will be made only for **Work** necessary to complete the **Work** included inthe original scope of the **Contract** and/or for non-material changes to the scope of the **Contract**. Changes are not permitted for any material alteration in the scope of **Work** in the **Contract**.

25.3 The **Contractor** shall be entitled to a price adjustment for **Extra Work** performed pursuant toa written change order. Adjustments to price shall be computed in one or more of the following ways:

25.3.1 By applicable unit prices specified in the **Contract**; and/or

25.3.2 By agreement of a fixed price; and/or

25.3.3 By time and material records; and/or

25.3.4 In any other manner approved by the **CCPO**.

25.4 All payments for change orders are subject to pre-audit by the **Engineering Audit Officer** and may be post-audited by the **Comptroller** and/or the **Agency**.

ARTICLE 26. METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK

26.1 Overrun of Unit Price Item: An overrun is any quantity of a unit price item which the **Contractor** is directed to provide which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule.

26.1.1 For any unit price item, the **Contractor** will be paid at the unit price bid for any quantity up to one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule. If during the progress of the **Work**, the actual quantity of any unit price item required to complete the **Work** approaches the estimated quantity forthat item, and for any reason it appears that the actual quantity of any unit price item necessary to complete the **Work** will exceed the estimated quantity for that item by twenty- five (25%) percent, the **Contractor** shall immediately notify the **Engineer** of such anticipated overrun. The **Contractor** shall not be compensated for any quantity of a unit price item provided which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule without written authorization from the **Engineer**.

26.1.2 If the actual quantity of any unit price item necessary to complete the **Work** will exceed one hundred twenty five (125%) percent of the estimated quantity for that item set forth in the bid schedule, the **City** reserves the right and the **Contractor** agrees to negotiate a new unit price for such item. In no event shall such negotiated new unit price exceed the unit bid price. If the **City** and **Contractor** cannot agree on a new unit price, then the **City** shall order the **Contractor** and the **Contractor** agrees to provide additional quantities of the item on the

basis of time and material records for the actual and reasonable cost as determined under Article 26.2, but in no event at a unit price exceeding the unit price bid.

26.2 **Extra Work:** For **Extra Work** where payment is by agreement on a fixed price in accordance with Article 25.3.2, the price to be paid for such **Extra Work** shall be based on the fair and reasonable estimated cost of the items set forth below. For **Extra Work** where payment is based on time and material records in accordance with Article 25.3.3, the price to be paid for such **Extra Work** shall be the actual and reasonable cost of the items set forth below, calculated in accordance with the formula specified therein, if any.

26.2.1 Necessary materials (including transportation to the **Site**); plus

26.2.2 Necessary direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits; plus

26.2.3 Sales and personal property taxes, if any, required to be paid on materials not incorporated into such **Extra Work**; plus

26.2.4 Reasonable rental value of **Contractor**-owned (or **Subcontractor**-owned, as applicable), necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per operating hour: (.035) x (HP rating) x (Fuel cost/gallon). Reasonable rental value is defined as the lower of either seventy-five percent of the monthly prorated rental rates established in "The AED Green Book, Rental Rates and Specifications for Construction Equipment" published by Equipment Watch (the "Green Book"), or seventy-five percent of the monthly prorated rental rates established in the "Rental Rate Blue Book for Construction Equipment" published by Equipment Watch (the "Blue Book") (the applicable Blue Book rate being for rental only without the addition of any operational costs listed in the Blue Book). The reasonable rental value is deemed to be inclusive of all operating costs except for fuel/energy consumption and equipment operator's wages/costs. For multiple shift utilization, reimbursement shall be calculated as follows: first shift shall be seventy-five (75%) percent of such rental rates; second shift shall be sixty (60%) percent of the first shift rate; and third shift shall be forty (40%) percent of the first shift rate. Equipment on standby shall be reimbursed at one-third (1/3) the prorated monthly rental rate. **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment includes equipment from rental companies affiliated with or controlled by the **Contractor** (or **Subcontractor**, as applicable)**,** as determined by the **Commissioner**. In establishing cost reimbursement for non-operating **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment (scaffolding, sheeting systems, road plates, etc.), the **City** may restrict reimbursement to a purchase-salvage/life cycle basis if less than the computed rental costs; plus

26.2.5 Necessary installation and dismantling of such plant and equipment, including transportation to and from the **Site**, if any, provided that, in the case of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) equipment rented from a third party, the cost of installation and dismantling are not allowable if such costs are included in the rental rate; plus

26.2.6 Necessary fees charged by governmental entities; plus

26.2.7 Necessary construction-related service fees charged by non-governmental entities, such as landfill tipping fees; plus

26.2.8 Reasonable rental costs of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per hour of operation: (.035) x (HP rating) x (Fuel cost/gallon). In lieu of renting, the **City** reserves the right to direct the purchase of non-operating equipment (scaffolding, sheeting systems, road plates, etc.), with payment on a purchase-salvage/life cycle basis, if less than the projected rental costs; plus

26.2.9 Workers' Compensation Insurance, and any insurance coverage expressly required by the **City** for the performance of the **Extra Work** which is different than the types of insurance required by Article 22 and Schedule A of the General Conditions. The cost of Workers' Compensation Insurance is subject to applicable payroll limitation caps and shall be based upon the carrier's Manual Rate for such insurance derived from the applicable class Loss Cost ("LC") and carrier's Lost Cost Multiplier ("LCM") approved by the New York State Department of Financial Services, and with the exception of experience rating, rate modifiers as promulgated by the New York Compensation Insurance Rating Board ("NYCIRB"); plus

26.2.10 Additional costs incurred as a result of the **Extra Work** for performance and payment bonds; plus

26.2.11 Twelve percent (12%) percent of the total of items in Articles 26.2.1 through 26.2.5 as compensation for overhead, except that no percentage for overhead will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes. Overhead shall include without limitation, all costs and expenses in connection with administration, management superintendence, small tools, and insurance required by Schedule A of the General Conditions other than Workers' Compensation Insurance; plus

26.2.12 Ten (10%) percent of the total of items in Articles 26.2.1 through 26.2.5, plus the items in Article 26.2.11, as compensation for profit, except that no percentage for profit will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes; plus

26.2.13 Five (5%) percent of the total of items in Articles 26.2.6 through 26.2.10 as compensation for overhead and profit.

26.3 Where the **Extra Work** is performed in whole or in part by other than the **Contractor's** own forces pursuant to Article 26.2, the **Contractor** shall be paid, subject to pre-audit by the **Engineering Audit Officer**, the cost of such **Work** computed in accordance with Article 26.2 above, plus an additional allowance of five (5%) percent to cover the **Contractor's** overhead and profit.

26.4 Where a change is ordered, involving both **Extra Work** and omitted or reduced **Contract Work,** the **Contract** price shall be adjusted, subject to pre-audit by the **EAO**, in an amount based on the difference between the cost of such **Extra Work** and of the omitted or reduced **Work**.

26.5 Where the **Contractor** and the **Commissioner** can agree upon a fixed price for **Extra Work** in accordance with Article 25.3.2 or another method of payment for **Extra Work** in accordance with Article 25.3.4, or for **Extra Work** ordered in connection with omitted **Work**, such method, subject to pre-audit by the **EAO**, may, at the option of the **Commissioner**, be substituted for the cost plus a percentage method provided in Article 26.2; provided, however, that if the **Extra Work** is performed by a **Subcontractor**, the **Contractor** shall not be entitled to receive more than an additional allowance of five (5%) percent for overhead and profit over

the cost of such **Subcontractor's Work** as computed in accordance with Article 26.2.

ARTICLE 27. RESOLUTION OF DISPUTES

27.1 All disputes between the **City** and the **Contractor** of the kind delineated in this Article 27.1 that arise under, or by virtue of, this **Contract** shall be finally resolved in accordance with the provisions of this Article 27 and the **PPB** Rules. This procedure for resolving all disputes of the kind delineated herein shall be the exclusive means of resolving any such disputes.

27.1.1 This Article 27 shall not apply to disputes concerning matters dealt with in other sections of the **PPB** Rules, or to disputes involving patents, copyrights, trademarks, or trade secrets (as interpreted by the courts of New York State) relating to proprietary rights in computer software.

27.1.2 This Article 27 shall apply only to disputes about the scope of **Work** delineated by the **Contract**, the interpretation of **Contract** documents, the amount to be paid for **Extra Work** or disputed work performed in connection with the **Contract**, the conformity of the **Contractor's Work** to the **Contract**, and the acceptability and quality of the **Contractor's Work**; such disputes arise when the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** makes a determination with which the **Contractor** disagrees.

27.2 All determinations required by this Article 27 shall be made in writing clearly stated, with a reasoned explanation for the determination based on the information and evidence presented to the party making the determination. Failure to make such determination within the time required by this Article 27 shall be deemed a non-determination without prejudice that will allow application to the next level.

27.3 During such time as any dispute is being presented, heard, and considered pursuant to this Article 27, the **Contract** terms shall remain in force and the **Contractor** shall continue to perform **Work** as directed by the **ACCO** or the **Engineer**. Failure of the **Contractor** to continue **Work** as directed shall constitute a waiver by the **Contractor** of its claim.

27.4 Presentation of Disputes to **Commissioner**.

Notice of Dispute and Agency Response. The **Contractor** shall present its dispute in writing ("Notice of Dispute") to the **Commissioner** within thirty (30) Days of receiving written notice of the determination or action that is the subject of the dispute. This notice requirement shall not be read to replace any other notice requirements contained in the **Contract**. The Notice of Dispute shall include all the facts, evidence, documents, or other basis upon which the **Contractor** relies in support of its position, as well as a detailed computation demonstrating how any amount of money claimed by the **Contractor** inthe dispute was arrived at. Within thirty (30) Days after receipt of the detailed written submission comprising the complete Notice of Dispute, the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** shall submit to the **Commissioner** all materials he or she deems pertinent to the dispute. Following initial submissions to the **Commissioner**, either party may demand of the other the production of any document or other material the demanding party believes may be relevant to the dispute. The requested party shall produce all relevant materials that are not otherwise protected by a legal privilege recognized by the courts of New York State. Any question of relevancy shall be determined by the **Commissioner** whose decision shall be final. Willful failure of the **Contractor** to produce any requested material whose relevancy the **Contractor** has not disputed, or whose relevancy has been affirmatively determined, shall constitute a waiver by the **Contractor** of its claim.

27.4.1 **Commissioner** Inquiry. The **Commissioner** shall examine the material and may, in his or her discretion, convene an informal conference with the **Contractor**, the **ACCO**, and the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** to resolve the issue by mutual consent prior to reaching a determination. The **Commissioner** may seek such technical or other expertise as he or she shall deem appropriate, including the use of neutral mediators, and require any such additional material from either or both parties as he or she deems fit. The **Commissioner's** ability to render, and the effect of, a decision hereunder shall not be impaired by any negotiations in connection with the dispute presented, whether or not the **Commissioner** participated therein. The **Commissioner** may or, at the request of any party to the dispute, shall compel the participation of any **Other Contractor** with a contract related to the **Work** of this **Contract**, and that **Contractor** shall be bound by the decision of the **Commissioner**. Any **Other Contractor** thus brought into the dispute resolution proceeding shall have the same rights and obligations under this Article 27 as the **Contractor** initiating the dispute.

27.4.2 **Commissioner** Determination. Within thirty (30) **Days** after the receipt of all materials and information, or such longer time as may be agreed to by the parties, the **Commissioner** shall make his or her determination and shall deliver or send a copy of such determination to the **Contractor**, the **ACCO,** and **Engineer**, **Resident Engineer**,**Engineering Audit Officer**, or other designee of the **Commissioner**, as applicable, together with a statement concerning how the decision may be appealed.

27.4.3 Finality of **Commissioner's** Decision. The **Commissioner's** decision shall be final and binding on all parties, unless presented to the Contract Dispute Resolution Board pursuant to this Article 27. The **City** may not take a petition to the Contract Dispute Resolution Board. However, should the **Contractor** take such a petition, the **City** may seek, and the Contract Dispute Resolution Board may render, a determination less favorable to the **Contractor** and more favorable to the **City** than the decision of the **Commissioner**.

27.5 Presentation of Dispute to the **Comptroller**. Before any dispute may be brought by the **Contractor** to the Contract Dispute Resolution Board, the **Contractor** must first present its claim to the **Comptroller** for his or her review, investigation, and possible adjustment.

27.5.1 Time, Form, and Content of Notice. Within thirty (30) **Days** of its receipt of a decision by the **Commissioner,** the **Contractor** shall submit to the **Comptroller** and to the **Commissioner** a Notice of Claim regarding its dispute with the **Agency**. The Notice of Claim shall consist of (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written decision of the **Commissioner**; and (iii) a copy of all materials submitted by the **Contractor** to the **Agency**, including the Notice of Dispute. The **Contractor** may not present to the **Comptroller** any material not presented to the **Commissioner**, except at the request of the **Comptroller**.

27.5.2 Response. Within thirty (30) **Days** of receipt of the Notice of Claim, the **Agency** shall make available to the **Comptroller** a copy of all material submitted by the **Agency** to the **Commissioner** in connection with the dispute. The **Agency** may not present to the **Comptroller** any material not presented to the **Commissioner** except at the request of the **Comptroller**.

27.5.3 **Comptroller** Investigation. The **Comptroller** may investigate the claim in dispute and, in the course of such investigation, may exercise all powers provided in Sections 7-201 and 7-203 of the Administrative Code. In addition, the **Comptroller** may demand of either party, and such party shall provide, whatever additional material the **Comptroller** deems pertinent to the claim, including original business records of the **Contractor**. Willful failure of the **Contractor** to produce within fifteen (15) **Days** any material requested by the **Comptroller** shall constitute a waiver by the **Contractor** of its claim. The **Comptroller** may also schedule an informal conference to be attended by the **Contractor**, **Agency** representatives, and any other personnel desired by the **Comptroller**.

27.5.4 Opportunity of **Comptroller** to Compromise or Adjust Claim. The **Comptroller** shall have forty-five (45) **Days** from his or her receipt of all materials referred to in Article 27.5.3 to investigate the disputed claim. The period for investigation and compromise may be further extended by agreement between the **Contractor** and the **Comptroller**, to a maximum of ninety (90) **Days** from the **Comptroller's** receipt of all materials. The **Contractor** may not present its petition to the Contract Dispute Resolution Board until the period for investigation and compromise delineated in this Article 27.5.4 has expired. In compromising or adjusting any claim hereunder, the **Comptroller** may not revise or disregard the terms of the **Contract** between the parties.

27.6 Contract Dispute Resolution Board. There shall be a Contract Dispute Resolution Board composed of:

27.6.1 The chief administrative law judge of the Office of Administrative Trials and Hearings (OATH) or his/her designated OATH administrative law judge, who shall act as chairperson, and may adopt operational procedures and issue such orders consistent with this Article 27 as may be necessary in the execution of the Contract Dispute Resolution Board's functions, including, but not limited to, granting extensions of time to present or respond to submissions;

27.6.2 The **CCPO** or his/her designee; any designee shall have the requisite background to consider and resolve the merits of the dispute and shall not have participated personally and substantially in the particular matter that is the subject of the dispute or report to anyone who so participated; and

27.6.3 A person with appropriate expertise who is not an employee of the **City**. This person shall be selected by the presiding administrative law judge from a prequalified panel of individuals, established and administered by OATH with appropriate background to act as decision-makers in a dispute. Such individual may not have a contract or dispute with the **City** or be an officer or employee of any company or organization that does, or regularly represents persons, companies, or organizations having disputes with the **City**.

27.7 Petition to the Contract Dispute Resolution Board. In the event the claim has not been settled or adjusted by the **Comptroller** within the period provided in this Article 27, the **Contractor**, within thirty (30) **Days** thereafter, may petition the Contract Dispute Resolution Board to review the

Commissioner's determination.

27.7.1 Form and Content of Petition by **Contractor**. The **Contractor** shall present its dispute to the Contract Dispute Resolution Board in the form of a petition, which shall include (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed, and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written Decision of the **Commissioner,** (iii) copies of all materials submitted by the **Contractor** to the Agency; (iv) a copy of the written decision of the **Comptroller**, if any, and (v) copies of all correspondence with, or written material submitted by the **Contractor**, to the **Comptroller**. The **Contractor** shall concurrently submit four (4) complete sets of the Petition: one set to the **City** Corporation Counsel (Attn: Commercial and Real Estate Litigation Division) and three (3) sets to the Contract Dispute Resolution Board at OATH's offices with proof of service on the **City** Corporation Counsel. In addition, the **Contractor** shall submit a copy of the written statement of the substance of the dispute, cited in (i) above, to both the **Commissioner** and the **Comptroller**.

27.7.2 **Agency** Response. Within thirty (30) **Days** of its receipt of the Petition by the **City** Corporation Counsel, the **Agency** shall respond to the brief written statement of the **Contractor** and make available to the Contract Dispute Resolution Board all material it submitted to the **Commissioner** and **Comptroller**. Three (3) complete copies of the **Agency** response shall be provided to the Contract Dispute Resolution Board and one to the **Contractor**. Extensions of time for submittal of the **Agency** response shall be given as necessary upon a showing of good cause or, upon consent of the parties, for an initial period of up to thirty (30) Days.

27.7.3 Further Proceedings. The Contract Dispute Resolution Board shall permit the **Contractor** to present its case by submission of memoranda, briefs, and oral argument. The Contract Dispute Resolution Board shall also permit the **Agency** to present its case in response to the **Contractor** by submission of memoranda, briefs, and oral argument. If requested by the **City** Corporation Counsel, the **Comptroller** shall provide reasonable assistance in the preparation of the **Agency's** case. Neither the **Contractor** nor the **Agency** may support its case with any documentation or other material that was not considered by the **Comptroller**, unless requested by the Contract Dispute Resolution Board. The Contract Dispute Resolution Board, in its discretion, may seek such technical or other expert advice as it shall deem appropriate and may seek, on its own or upon application of a party, any such additional material from any party as it deems fit. The Contract Dispute Resolution Board, in its discretion, may combine more than one dispute between the parties for concurrent resolution.

27.7.4 Contract Dispute Resolution Board Determination. Within forty-five (45) **Days** of the conclusion of all written submissions and oral arguments, the Contract Dispute Resolution Board shall render a written decision resolving the dispute. In an unusually complex case, the Contract Dispute Resolution Board may render its decision in a longer period, not to exceed ninety (90) **Days**, and shall so advise the parties at the commencement of this period. The Contract Dispute Resolution Board's decision must be consistent with the terms of the **Contract**. Decisions of the Contract Dispute Resolution Board shall only resolve matters before the Contract Dispute Resolution Board and shall not have precedential effect with respect to matters not before the Contract Dispute Resolution Board.

27.7.5 Notification of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board shall send a copy of its decision to the **Contractor**, the **ACCO**, the Engineer, the **Comptroller**, the **City** Corporation Counsel, the CCPO, and the **PPB**. A decision in favor of the **Contractor** shall be subject to the prompt payment provisions of the **PPB** Rules. The

Required Payment Date shall be thirty (30) Days after the date the parties are formally notified of the Contract Dispute Resolution Board's decision.

27.7.6 Finality of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board's decision shall be final and binding on all parties. Any party may seek review of the Contract Dispute Resolution Board's decision solely in the form of a challenge, filed within four (4) months of the date of the Contract Dispute Resolution Board's decision, in a court of competent jurisdiction of the State of New York, County of New York pursuant to Article 78 of the Civil Practice Law and Rules. Such review by the court shall be limited to the question of whether or not the Contract Dispute Resolution Board's decision was made in violation of lawful procedure, was affected by an error of **Law**, or was arbitrary and capricious or an abuse of discretion. No evidence or information shall be introduced or relied upon in such proceeding that was not presented to the Contract Dispute Resolution Board in accordance with this Article 27.

27.8 Any termination, cancellation, or alleged breach of the **Contract** prior to or during the pendency of any proceedings pursuant to this Article 27 shall not affect or impair the ability of the **Commissioner** or Contract Dispute Resolution Board to make a binding and final decision pursuant to this Article 27.

ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK OR WORK ON ATIME & MATERIALS BASIS

28.1 While the **Contractor** or any of its **Subcontractors** is performing **Work** on a time and material basis or **Extra Work** on a time and material basis ordered by the **Commissioner** under Article 25, or where the **Contractor** believes that it or any of its **Subcontractors** is performing **Extra Work** but a final determination by **Agency** has not been made, or the **Contractor** or any of its **Subcontractors** is performing disputed **Work** (whether on or off the **Site**), or complying with a determination or order under protest in accordance with Articles 11, 27, and 30, in each such case the **Contractor** shall furnish the **Resident Engineer** daily with three (3) copies of written statements signed by the **Contractor's** representative at the **Site** showing:

28.1.1 The name, trade, and number of each worker employed on such **Work** or engaged in complying with such determination or order, the number of hours employed, and the character of the **Work** each is doing; and

28.1.2 The nature and quantity of any materials, plant and equipment furnished or used in connection with the performance of such **Work** or compliance with such determination or order, and from whom purchased or rented.

28.2 A copy of such statement will be countersigned by the **Resident Engineer**, noting thereon any items not agreed to or questioned, and will be returned to the **Contractor** within two (2) **Days** after submission.

28.3 The **Contractor** and its **Subcontractors**, when required by the **Commissioner**, or the **Comptroller**, shall also produce for inspection, at the office of the **Contractor** or **Subcontractor**, any and all of its books, bid documents, financial statements, vouchers, records, daily job diaries and reports, and cancelled checks, and any other documents relating to showing the nature and quantity of the labor, materials, plant and equipment actually used in the performance of such **Work**, or in complying with such determination or order, and the amounts expended therefor, and shall permit the **Commissioner** and the

Comptroller to make such extracts therefrom, or copies thereof, as they or either of them may desire.

28.4 In connection with the examination provided for herein, the **Commissioner**, upon demand therefor, will produce for inspection by the **Contractor** such records as the **Agency** may have withrespect to such **Extra Work** or disputed **Work** performed under protest pursuant to order of the **Commissioner**, except those records and reports which may have been prepared for the purpose of determining the accuracy and validity of the **Contractor's** claim.

28.5 Failure to comply strictly with these requirements shall constitute a waiver of any claim for extra compensation or damages on account of the performance of such **Work** or compliance with such determination or order.

ARTICLE 29. OMITTED WORK

29.1 If any **Contract Work** in a lump sum **Contract**, or if any part of a lump sum item in a unit price, lump sum, or percentage-bid **Contract** is omitted by the **Commissioner** pursuant to Article 33, the **Contract** price, subject to audit by the EAO, shall be reduced by a pro rata portion of the lump sum bid amount based upon the percent of **Work** omitted subject to Article 29.4. For the purpose of determining the pro rata portion of the lump sum bid amount, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be the determining factor.

29.2 If the whole of a lump sum item or units of any other item is so omitted by the **Commissioner** in a unit price, lump sum, or percentage-bid **Contract**, then no payment will be made therefor except as provided in Article 29.4.

29.3 For units that have been ordered but are only partially completed, the unit price shall be reduced by a pro rata portion of the unit price bid based upon the percentage of **Work** omitted subject to Article 29.4.

29.4 In the event the **Contractor**, with respect to any omitted **Work**, has purchased any non-cancelable material and/or equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated into the **Work**, the **Contractor** shall be paid for such material and/or equipment in accordance with Article 64.2.1(b); provided, however, such payment is contingent upon the **Contractor's** delivery of such material and/or equipment in acceptable condition to a location designated by the **City**.

29.5 The **Contractor** agrees to make no claim for damages or for loss of overhead and profit with regard to any omitted **Work**.

ARTICLE 30. NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES; PRODUCTION OF FINANCIAL RECORDS

30.1 If the **Contractor** shall claim to be sustaining damages by reason of any act or omission of the **City** or its agents, it shall submit to the **Commissioner** within forty-five (45) **Days** from the time such damages are first incurred, and every thirty (30) **Days** thereafter to the extent additional damages are being incurred for the same condition, verified statements of the details and the amounts of such damages, together with documentary evidence of such damages. The **Contractor** may submit any of the above statements within such additional time as may be granted by the **Commissioner** in writing upon written request therefor. Failure of the **Commissioner** to respond in writing to a written request for additional time within thirty (30) **Days** shall be deemed a denial of the request. On failure of the **Contractor** to strictly comply with

the foregoing provisions, such claims shall be deemed waived and no right to recover on such claims shall exist. Damages that the **Contractor** may claim in any action or dispute resolution procedure arising under or by reason of this **Contract** shall not be different from or in excess of the statements and documentation made pursuant to this Article 30. This Article 30.1 does not apply to claims submitted to the **Commissioner** pursuant to Article 11 or to claims disputing a determination under Article 27.

30.2 In addition to the foregoing statements, the **Contractor** shall, upon notice from the **Commissioner**, produce for examination at the **Contractor's** office, by the **Engineer**, **Architect** or **Project Manager**, all of its books of account, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**, and submit itself and persons in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.3 In addition to the statements required under Article 28 and this Article 30, the **Contractor** and/or its **Subcontractor** shall, within thirty (30) **Days** upon notice from the **Commissioner** or **Comptroller**, produce for examination at the **Contractor's** and/or **Subcontractor's** office, by a representative of either the **Commissioner** or **Comptroller**, all of its books of account, bid documents, financial statements, accountant workpapers, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**. Further, the **Contractor** and/or its **Subcontractor** shall submit any person in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.4 Unless the information and examination required under Article 30.3 is provided by the **Contractor** and/or its **Subcontractor** upon thirty (30) **Days'** notice from the **Commissioner** or **Comptroller**, or upon the **Commissioner's** or **Comptroller's** written authorization to extend the time to comply, the **City** shall be released from all claims arising under, relating to or by reason of this **Contract**, except for sums certified by the **Commissioner** to be due under the provisions of this **Contract**. It is further stipulated and agreed that no person has the power to waive any of the foregoing provisions and that in any action or dispute resolution procedure against the **City** to recover any sum in excess of the sums certified by the **Commissioner** to be due under or by reason of this **Contract**, the **Contractor** must allege in its complaint and prove, at trial or during such dispute resolution procedure, compliance with the provisions of this Article 30.

30.5 In addition, after the commencement of any action or dispute resolution procedure by the **Contractor** arising under or by reason of this **Contract**, the **City** shall have the right to require the **Contractor** to produce for examination under oath, up until the trial of the action or hearing before the Contract Dispute Resolution Board, the books and documents described in Article 30.3 and submit itself and all persons in its employ for examination under oath. If this Article 30 is not complied with as required, then the **Contractor** hereby consents to the dismissal of the action or dispute resolutionprocedure.

CHAPTER VII: POWERS OF THE RESIDENT ENGINEER, THE ENGINEER ORARCHITECT AND THE COMMISSIONER

ARTICLE 31. THE RESIDENT ENGINEER

31.1 The **Resident Engineer** shall have the power to inspect, supervise, and control the performance

of the **Work**, subject to review by the **Commissioner**. The **Resident Engineer** shall not, however, have the power to issue an **Extra Work** order, except as specifically designated in writing bythe **Commissioner**.

ARTICLE 32. THE ENGINEER OR ARCHITECT OR PROJECT MANAGER

32.1 The **Engineer** or **Architect** or **Project Manager**, in addition to those matters elsewhere herein delegated to the **Engineer** and expressly made subject to his/her determination, direction or approval, shall have the power, subject to review by the **Commissioner**:

32.1.1 To determine the amount, quality, and location of the **Work** to be paid for hereunder; and

32.1.2 To determine all questions in relation to the **Work**, to interpret the **Contract Drawings**, **Specifications**, and **Addenda**, and to resolve all patent inconsistencies or ambiguities therein; and

32.1.3 To determine how the **Work** of this **Contract** shall be coordinated with **Work** of **Other Contractors** engaged simultaneously on this **Project**, including the power to suspend any part of the **Work**, but not the whole thereof; and

32.1.4 To make minor changes in the **Work** as he/she deems necessary, provided such changes do not result in a net change in the cost to the **City** or to the **Contractor** of the **Work** to be done under the **Contract**; and

32.1.5 To amplify the **Contract Drawings**, add explanatory information and furnish additional **Specifications** and drawings, consistent with this **Contract**.

32.2 The foregoing enumeration shall not imply any limitation upon the power of the **Engineer** or **Architect** or **Project Manager**, for it is the intent of this **Contract** that all of the **Work** shall generally be subject to his/her determination, direction, and approval, except where the determination, direction or approval of someone other than the **Engineer** or **Architect** or **Project Manager** is expressly called for herein.

32.3 The **Engineer** or **Architect** or **Project Manager** shall not, however, have the power to issuean **Extra Work** order, except as specifically designated in writing by the **Commissioner**.

ARTICLE 33. THE COMMISSIONER

33.1 The **Commissioner**, in addition to those matters elsewhere herein expressly made subject to his/her determination, direction or approval, shall have the power:

33.1.1 To review and make determinations on any and all questions in relation to this **Contract** and its performance; and

33.1.2 To modify or change this **Contract** so as to require the performance of **Extra Work** (subject, however, to the limitations specified in Article 25) or the omission of **Contract Work**; and

33.1.3 To suspend the whole or any part of the **Work** whenever in his/her judgment such suspension is required:

33.1.3(a) In the interest of the **City** generally; or

33.1.3(b) To coordinate the **Work** of the various contractors engaged on this **Project** pursuant to the provisions of Article 12; or

33.1.3(c) To expedite the completion of the entire **Project** even though the completion of this particular **Contract** may thereby be delayed.

ARTICLE 34. NO ESTOPPEL

34.1 Neither the **City** nor any **Agency**, official, agent or employee thereof, shall be bound, precluded or estopped by any determination, decision, approval, order, letter, payment or certificate made or given under or in connection with this **Contract** by the **City**, the **Commissioner**, the **Engineer**, the **Resident Engineer**, or any other official, agent or employee of the **City**, either before or after the final completion and acceptance of the **Work** and payment therefor:

34.1.1 From showing the true and correct classification, amount, quality or character of the **Work** actually done; or that any such determination, decision, order, letter, payment or certificate was untrue, incorrect or improperly made in any particular, or that the **Work**, or any part thereof, does not in fact conform to the requirements of this **Contract**; and

34.1.2 From demanding and recovering from the **Contractor** any overpayment made to it, or such damages as the **City** may sustain by reason of the **Contractor's** failure to perform each and every part of its **Contract**.

CHAPTER VIII: LABOR PROVISIONS

ARTICLE 35. EMPLOYEES

35.1 The **Contractor** and its **Subcontractors** shall not employ on the **Work**:

35.1.1 Anyone who is not competent, faithful and skilled in the **Work** for which he/she shall be employed; and whenever the **Commissioner** shall inform the **Contractor**, in writing, that any employee is, in his/her opinion, incompetent, unfaithful or disobedient, that employee shall be discharged from the **Work** forthwith, and shall not again be employed upon it; or

35.1.2 Any labor, materials or means whose employment, or utilization during the course of this **Contract**, may tend to or in any way cause or result in strikes, work stoppages, delays, suspension of **Work** or similar troubles by workers employed by the **Contractor** or its **Subcontractors**, or by any of the trades working in or about the buildings and premises where **Work** is being performed under this **Contract**, or by **Other Contractors** or their **Subcontractors** pursuant to other contracts, or on any other building or premises owned or operated by the **City**, its **Agencies**, departments, boards or authorities. Any violation by the **Contractor** of this requirement may, upon certification of the **Commissioner**, be considered as proper and sufficient cause for declaring the **Contractor** to be in default, and for the **City** to take action against it as set forth in Chapter X of this **Contract**, or such other article of this **Contract** as the Commissioner may deem proper; or

35.1.3 In accordance with Section 220.3-e of the Labor Law of the State of New York (hereinafter "Labor Law"), the **Contractor** and its **Subcontractors** shall not employ on the **Work** any apprentice, unless he/she is a registered individual, under a bona fide program registered with the New York State Department of Labor. The allowable ratio of apprentices to journey-level workers in any craft classification shall not be greater than the ratio permitted to the **Contractor** as to its work force on any job under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered as above, shall be paid the wage rate determined by the **Comptroller** of the **City** for the classification of **Work** actually performed. The **Contractor** or **Subcontractor** will be required to furnish written evidence of the registration of its program and apprentices as well as all the appropriate ratios and wage rates, for the area of the construction prior to using any apprentices on the **Contract Work**.

35.2 If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, all laborers, workers, and mechanics employed in the performance of the C**ontract** on the public work site, either by the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by the **Contract**, shall be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration.

35.3 In accordance with Local Law Nos. 30-2012 and 33-2012, codified at sections 6-132 and 12-113 of the Administrative Code, respectively,

35.3.1 The **Contractor** shall not take an adverse personnel action with respect to an officer or employee in retaliation for such officer or employee making a report of information concerning conduct which such officer or employee knows or reasonably believes to involve corruption, criminal activity, conflict of interest, gross mismanagement or abuse of authority by any officer or employee relating to this **Contract** to (a) the Commissioner of the Department of Investigation, (b) a member of the New York City Council, the Public Advocate, or the **Comptroller**, or (c) the **CCPO**, **ACCO**, **Agency** head, or **Commissioner**.

35.3.2 If any of the **Contractor**'s officers or employees believes that he or she has been the subject of an adverse personnel action in violation of Article 35.3.1, he or she shall be entitled to bring a cause of action against the **Contractor** to recover all relief necessary to make him or her whole. Such relief may include but is not limited to: (a) an injunction to restrain continued retaliation, (b) reinstatement to the position such employee would have had but for the retaliation or to an equivalent position, (c) reinstatement of full fringe benefits and seniority rights, (d) payment of two times back pay, plus interest, and (e) compensation for any special damages sustained as a result of the retaliation, including litigation costs and reasonable attorney's fees.

35.3.3 The **Contractor** shall post a notice provided by the **City** in a prominent and accessible place on any site where work pursuant to the **Contract** is performed that contains information about:

35.3.3(a) how its employees can report to the New York City Department of Investigation allegations of fraud, false claims, criminality or corruption arising outof or in connection with the **Contract**; and

35.3.3(b) the rights and remedies afforded to its employees under Administrative Code sections 7-805 (the New York City False Claims Act) and 12-113 (the Whistleblower Protection Expansion Act) for lawful acts taken in connection withthe

reporting of allegations of fraud, false claims, criminality or corruption in connection with the **Contract**.

35.3.4 For the purposes of this Article 35.3, "adverse personnel action" includes dismissal, demotion, suspension, disciplinary action, negative performance evaluation, any action resulting in loss of staff, office space, equipment or other benefit, failure to appoint, failure to promote, or any transfer or assignment or failure to transfer or assign against the wishes of the affected officer or employee.

35.3.5 This Article 35.3 is applicable to all of the **Contractor**'s **Subcontractors** having subcontracts with a value in excess of $100,000; accordingly, the **Contractor** shall include this rider in all subcontracts with a value a value in excess of $100,000.

35.4 Article 35.3 is not applicable to this **Contract** if it is valued at $100,000 or less. Articles 35.3.1, 35.3.2, 35.3.4, and 35.3.5 are not applicable to this **Contract** if it was solicited pursuant to a finding of an emergency.

35.5 Paid Sick Leave Law.

35.5.1 Introduction and General Provisions.

35.5.1(a) The Earned Sick Time Act, also known as the Paid Sick Leave Law ("PSLL"), requires covered employees who annually perform more than 80 hours of work in New York City to be provided with paid sick time[2]. Contractors of the **City** or of other governmental entities may be required to provide sick time pursuant to the PSLL.

35.5.1(b) The PSLL became effective on April 1, 2014, and is codified at Title 20, Chapter 8, of the New York City Administrative Code. It is administered by the City's Department of Consumer Affairs ("DCA"); DCA's rules promulgated under the PSLL are codified at Chapter 7 of Title 6 of the Rules of the City of New York ("Rules").

35.5.1(c) The **Contractor** agrees to comply in all respects with the PSLL and the Rules, and as amended, if applicable, in the performance of this **Contract**. The **Contractor** further acknowledges that such compliance is a material term of this **Contract** and that failure to comply with the PSLL in performance of this **Contract** may result in its termination.

35.5.1(d) The **Contractor** must notify the **Agency Chief Contracting Officer** of the **Agency** with whom it is contracting in writing within ten (10) days of receipt of a complaint (whether oral or written) regarding the PSLL involving the performance of this **Contract**. Additionally, the **Contractor** must cooperate with DCA's education efforts and must comply with DCA's subpoenas and other document demands as set forth in the PSLL and Rules.

35.5.1(e) The PSLL is summarized below for the convenience of the **Contractor**. The **Contractor** is advised to review the PSLL and Rules in their entirety. On the

[2] Pursuant to the PSLL, if fewer than five employees work for the same employer, as determined pursuant to New York City Administrative Code § 20-912(g), such employer has the option of providing such employees uncompensated sick time.

website www.nyc.gov/PaidSickLeave there are links to the PSLL and the associated Rules as well as additional resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which the **Contractor** can get more information about how to comply with the PSLL. The **Contractor** acknowledges that it is responsible for compliance with the PSLL notwithstanding any inconsistent language contained herein.

35.5.2 Pursuant to the PSLL and the Rules: Applicability, Accrual, and Use.

35.5.2(a) An employee who works within the City of New York for more than eighty hours in any consecutive 12-month period designated by the employer as its "calendar year" pursuant to the PSLL ("Year") must be provided sick time. Employers must provide a minimum of one hour of sick time for every 30 hours worked by an employee and compensation for such sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage. Employers are not required to provide more than 40 hours of sick time to an employee in any Year.

35.5.2(b) An employee has the right to determine how much sick time he or she will use, provided that employers may set a reasonable minimum increment for the use of sick time not to exceed four hours per **Day**. In addition, an employee may carry over up to 40 hours of unused sick time to the following Year, provided that no employer is required to allow the use of more than forty hours of sick time in a Year or carry over unused paid sick time if the employee is paid for such unused sick time and the employer provides the employee with at least the legally required amount of paid sick time for such employee for the immediately subsequent Year on the first **Day** of such Year.

35.5.2(c) An employee entitled to sick time pursuant to the PSLL may use sick time for any of the following:

i. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;
ii. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild or grandparent, or the child or parent of an employee's spouse or domestic partner) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;
iii. closure of such employee's place of business by order of a public official due to a public health emergency; or
iv. such employee's need to care for a child whose school or childcare providerhas been closed due to a public health emergency.

35.5.2(d) An employer must not require an employee, as a condition of taking sick time, to search for a replacement. However, an employer may require an employee to provide: reasonable notice of the need to use sick time; reasonable documentation that the use of sick time was needed for a reason above if for an absence of more than three consecutive work days; and/or written confirmation that an employee used sick time pursuant to the PSLL. However, an employer may not require documentation specifying the nature of a medical condition or otherwise require disclosure of the details of a medical condition as a condition of providing sick time and health information obtained solely due to an employee's use of sick time pursuant to the PSLL must be treated by the

employer as confidential.

35.5.2(e) If an employer chooses to impose any permissible discretionary requirement as a condition of using sick time, it must provide to all employees a written policy containing those requirements, using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny sick time to an employee because of non-compliance with such a policy.

35.5.2(f) Sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the sick time was used.

35.5.3 Exemptions and Exceptions. Notwithstanding the above, the PSLL does not apply to any of the following:

35.5.3(a) an independent contractor who does not meet the definition of employee under section 190(2) of the New York State Labor Law;

35.5.3(b) an employee covered by a valid collective bargaining agreement in effect on April 1, 2014, until the termination of such agreement;

35.5.3(c) an employee in the construction or grocery industry covered by a valid collective bargaining agreement if the provisions of the PSLL are expressly waived in such collective bargaining agreement;

35.5.3(d) an employee covered by another valid collective bargaining agreement if such provisions are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the PSLL for such employee;

35.5.3(e) an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines his or her own schedule, has the ability to reject or accept any assignment referred to him or her, and is paid an average hourly wage that is at least four times the federal minimum wage;

35.5.3(f) an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

35.5.3(g) an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

35.5.3(h) a participant in a Work Experience Program (WEP) under section 336-c of the New York State Social Services Law.

35.5.4 Retaliation Prohibited. An employer may not threaten or engage in retaliation against an employee for exercising or attempting in good faith to exercise any right provided by the PSLL. In addition, an employer may not interfere with any investigation, proceeding, or hearing pursuant to the PSLL.

35.5.5 Notice of Rights.

35.5.5(a) An employer must provide its employees with written notice of their rights pursuant to the PSLL. Such notice must be in English and the primary language spoken

by an employee, provided that DCA has made available a translation into such language. Downloadable notices are available on DCA's website at http://www.nyc.gov/html/dca/html/law/PaidSickLeave.shtml.

35.5.5(b) Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed fifty dollars for each employee who was not given appropriate notice.

35.5.6 Records. An employer must retain records documenting its compliance with the PSLL for a period of at least three years, and must allow DCA to access such records in furtherance of an investigation related to an alleged violation of the PSLL.

35.5.7 Enforcement and Penalties.

35.5.7(a) Upon receiving a complaint alleging a violation of the PSLL, DCA has the right to investigate such complaint and attempt to resolve it through mediation. Within 30 **Days** of written notification of a complaint by DCA, or sooner in certain circumstances, the employer must provide DCA with a written response and such other information as DCA may request. If DCA believes that a violation of the PSLL has occurred, it has the right to issue a notice of violation to the employer.

35.5.7(b) DCA has the power to grant an employee or former employee all appropriate relief as set forth in New York City Administrative Code § 20-924(d). Such relief may include, among other remedies, treble damages for the wages that should have been paid, damages for unlawful retaliation, and damages and reinstatement for unlawful discharge. In addition, DCA may impose on an employer found to have violated the PSLL civil penalties not to exceed $500 for a first violation, $750 for a second violation within two years of the first violation, and
$1,000 for each succeeding violation within two years of the previous violation.

35.5.8 More Generous Polices and Other Legal Requirements. Nothing in the PSLL is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous sick time policy, or the obligation of an employer to comply with any contract,

collective bargaining agreement, employment benefit plan or other agreement providing more generous sick time. The PSLL provides minimum requirements pertaining to sick time and does not preempt, limit or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of sick leave or time, whether paid or unpaid, or that extends other protections to employees. The PSLL may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

35.6 HireNYC: Hiring and Reporting Requirements. This Article 35.6 applies to construction contracts of $1,000,000 or more. The **Contractor** shall comply with the requirements of Articles 35.6.1-35.6.5 for all non-trades jobs (e.g., for an administrative position arising out of **Work** ant located in New York City). The **Contractor** shall reasonably cooperate with SBS and the **City** on specific outreach events, including "Hire-on-the-Spot" events, for the hiring of trades workers in connection with the **Work**. If provided elsewhere in this **Contract**, this **Contract** is subject to a project labor agreement.

35.6.1 Enrollment. The **Contractor** shall enroll with the HireNYC system, found at www.nyc.gov/sbs, within thirty (30) days after the registration of this **Contract** pursuant to Section 328 of the New York City Charter. The **Contractor** shall provide information about the business, designate a primary contact and say whether it intends to hire for any entry

to mid-level job opportunities arising from this **Contract** and located in New York City, and, if so, the approximate start date of the first hire.

35.6.2 Job Posting Requirements.

35.6.2(a) Once enrolled in HireNYC, the **Contractor** agrees to update the HireNYC portal with all entry to mid-level job opportunities arising from this **Contract** and located in New York City, if any, which shall be defined as jobs requiring no more than an associate degree, as provided by the New York State Department of Labor (see Column F of https://labor.ny.gov/stats/2012-2022- NYS- Employment-Prospects.xls). The information to be updated includes the types of entry and mid-level positions made available from the work arising from the **Contract** and located in New York City, the number of positions, the anticipated schedule of initiating the hiring process for these positions, and the contact information for the **Contractor's** representative charged with overseeing hiring. The **Contractor** must update the HireNYC portal with any hiring needs arising from the contract and located in New York City, and the requirements of the jobs to be filled, no less than three weeks prior to the intended first day of employment for each new position, except with the permission of SBS, not to be unreasonably withheld, and must also update the HireNYC portal as set forth below.

35.6.2(b) After enrollment through HireNYC and submission of relevant information, SBS will work with the **Contractor** to develop a recruitment plan which will outline the candidate screening process, and will provide clear instructions as to when, where, and how interviews will take place. HireNYC will screen applicants based on employer requirements and refer applicants whom it believes are qualified to the **Contractor** for interviews. The **Contractor** must interview referred applicants whom it believes are qualified.

35.6.2(c) After completing an interview of a candidate referred by HireNYC, the **Contractor** must provide feedback via the portal within twenty (20) business days to indicate which candidates were interviewed and hired, if any. In addition, the **Contractor** shall provide the start date of new hires, and additional information reasonably related to such hires, within twenty (20) business days after the start date. In the event the **Contractor** does not have any job openings covered by this Rider in any given year, the **Contractor** shall be required to provide an annual update to HireNYC to that effect. For this purpose, the reporting year shall run from the date of the registration of the **Contract** pursuant to Charter section 328 and each anniversary date.

35.6.2(d) These requirements do not limit the **Contractor's** ability to assess the qualifications of prospective workers, and to make final hiring and retention decisions. No provision of this Article 35.6 shall be interpreted so as to require the **Contractor** to employ any particular worker.

35.6.2(e) In addition, the provisions of this Article 35.6 shall not apply to positions that the **Contractor** intends to fill with employees employed pursuant to the job retention provision of Section 22-505 of the Administrative Code of the City of New York. The **Contractor** shall not be required to report such openings with HireNYC. However, the **Contractor** shall enroll with the HireNYC system pursuant to Article 35.6.1, above, and, if such positions subsequently become open, then the remaining provisions of this Article 35.6 will apply.

35.6.3 Breach and Liquidated Damages. If the **Contractor** fails to comply with the termsof the **ContrSact** and this Article 35.6 (l) by not enrolling its business with HireNYC; (2) by not informing HireNYC, as required, of open positions; or (3) by failing to interview a qualified candidate, the **Agency** may assess liquidated damages in the amount of two- thousand five hundred dollars ($2,500) per breach. For all other events of noncompliance with the terms of this Article 35.6, the **Agency** may assess liquidated damages in the amount of five hundred dollars ($500) per breach. Furthermore, in the event the **Contractor** breaches the requirements of this Article 35.6 during the term of the **Contract**, the **City** may hold the **Contractor** in default of this **Contract**.

35.6.4 Audit Compliance. In addition to the auditing requirements set forth in other partsof the **Contract**, the **Contractor** shall permit SBS and the **City** to inspect any and all records concerning or relating to job openings or the hiring of individuals for work arising from the **Contract** and located in New York City. The **Contractor** shall permit an inspection within seven (7) business days of the request.

35.6.5 Other Reporting Requirements. The **Contractor** shall report to the **City**, on amonthly basis, all information reasonably requested by the **City** that is necessary for the **City** to comply with any reporting requirements imposed by **Law**, including any requirement that the **City** maintain a publicly accessible database. In addition, the **Contractor** agrees to comply with all reporting requirements imposed by **Law**, or as otherwise requested by the **City**.

35.6.6 Federal Hiring Requirements. If this **Contract** is federally funded (as indicated elsewhere in this Contract), the **Contractor** shall comply with all federal hiring requirements as may be set forth in this **Contract**, including, as applicable: (a) Section 3 of the HUD Act of 1968, which requires, to the greatest extent feasible, economic opportunities for 30 percent of new hires be given to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing and Executive Order 11246, which prohibits discrimination in employment due to race, color, religion,sex or national origin, and requires the implementation of goals for minority and female participation for work involving any construction trade.

ARTICLE 36. NO DISCRIMINATION

36.1 The **Contractor** specifically agrees, as required by Labor Law Section 220-e, as amended, that:

36.1.1 In the hiring of employees for the performance of **Work** under this **Contract** or any subcontract hereunder, neither the **Contractor**, **Subcontractor**, nor any person acting on behalf of such **Contractor** or **Subcontractor**, shall by reason of race, creed, color or national origin discriminate against any citizen of the State of New York who is qualifiedand available to perform the **Work** to which the employment relates;

36.1.2 Neither the **Contractor**, **Subcontractor**, nor any person on its behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of **Work** under this **Contract** on account of race, creed, color or national origin;

36.1.3 There may be deducted from the amount payable to the **Contractor** by the **City** under this **Contract** a penalty of fifty ($50.00) dollars for each person for each **Day** during which such person was discriminated against or intimidated in violation of the provisions of this

Contract; and

36.1.4 This **Contract** may be cancelled or terminated by the **City** and all moneys due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this Article 36.

36.1.5 This Article 36 covers all construction, alteration and repair of any public building or public work occurring in the State of New York and the manufacture, sale, and distribution of materials, equipment, and supplies to the extent that such operations are performed within the State of New York pursuant to this **Contract**.

36.2 The **Contractor** specifically agrees, as required by Section 6-108 of the Administrative Code,as amended, that:

36.2.1 It shall be unlawful for any person engaged in the construction, alteration or repairof buildings or engaged in the construction or repair of streets or highways pursuant to a **Contract** with the **City** or engaged in the manufacture, sale or distribution of materials, equipment or supplies pursuant to a **Contract** with the **City** to refuse to employ or to refuse to continue in any employment any person on account of the race, color or creed of such person.

36.2.2 It shall be unlawful for any person or any servant, agent or employee of any person, described in Article 36.1.2, to ask, indicate or transmit, orally or in writing, directly or indirectly, the race, color or creed or religious affiliation of any person employed or seeking employment from such person, firm or corporation.

36.2.3 Breach of the foregoing provisions shall be deemed a violation of a material provision of this **Contract**.

36.2.4 Any person, or the employee, manager or owner of or officer of such firm or corporation who shall violate any of the provisions of this Article 36.2 shall, upon conviction thereof, be punished by a fine of not more than one hundred ($100.00) dollars or by imprisonment for not more than thirty (30) **Days**, or both.

36.3 This **Contract** is subject to the requirements of Executive Order No. 50 (1980) ("E.O. 50"), as revised, and the rules and regulations promulgated thereunder. No contract will be awarded unless and until these requirements have been complied with in their entirety. By signing this **Contract**, the **Contractor** agrees that it:

36.3.1 Will not engage in any unlawful discrimination against any employee or applicantfor employment because of race, creed, color, national origin, sex, age, disability, marital status or sexual orientation with respect to all employment decisions including, but not limited to, recruitment, hiring, upgrading, demotion, downgrading, transfer, training, ratesof pay or other forms of compensation, layoff, termination, and all other terms and conditions of employment; and

36.3.2 Will not engage in any unlawful discrimination in the selection of **Subcontractors** on the basis of the owner's race, color, creed, national origin, sex, age, disability, marital status or sexual orientation; and

36.3.3 Will state in all solicitations or advertisements for employees placed by or on behalf of the **Contractor** that all qualified applicants will receive consideration for employment without unlawful discrimination based on race, creed, color, national origin, sex, age, citizens status,

disability, marital status, sexual orientation, or that it is an equal employment opportunity employer; and

36.3.4 Will send to each labor organization or representative of workers with which it has a collective bargaining agreement or other contract or memorandum of understanding, written notification of its equal employment opportunity commitments under E.O. 50 and the rules and regulations promulgated thereunder; and

36.3.5 Will furnish, before the award of the **Contract**, all information and reports, including an employment report, that are required by E.O. 50, the rules and regulations promulgated thereunder, and orders of the **City** Department of Business Services, Division of Labor Services (**DLS**) and will permit access to its books, records, and accounts by the **DLS** for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

36.4 The **Contractor** understands that in the event of its noncompliance with the nondiscrimination clauses of this **Contract** or with any of such rules, regulations, or orders, such noncompliance shall constitute a material breach of this **Contract** and noncompliance with E.O. 50 and the rules and regulations promulgated thereunder. After a hearing held pursuant to the rules of the **DLS**, the Director of the **DLS** may direct the **Commissioner** to impose any or all of the following sanctions:

36.4.1 Disapproval of the **Contractor**; and/or

36.4.2 Suspension or termination of the **Contract**; and/or

36.4.3 Declaring the **Contractor** in default; and/or

36.4.4 In lieu of any of the foregoing sanctions, the Director of the **DLS** may impose an employment program.

In addition to any actions taken under this **Contract**, failure to comply with E.O. 50 and the rules and regulations promulgated thereunder, in one or more instances, may result in a **City Agency** declaring the **Contractor** to be non-responsible in future procurements. The **Contractor** further agrees that it will refrain from entering into any **Contract** or **Contract** modification subject to E.O. 50 and the rules and regulations promulgated thereunder with a **Subcontractor** who is not in compliance with the requirements of E.O. 50 and the rules and regulations promulgated thereunder.

36.5 The **Contractor** specifically agrees, as required by Section 6-123 of the AdministrativeCode, that:

36.5.1 The **Contractor** will not engage in any unlawful discriminatory practice in violation of Title 8 of the Administrative Code; and

36.5.2 Any failure to comply with this Article 36.5 may subject the **Contractor** to the remedies set forth in Section 6-123 of the Administrative Code, including, where appropriate, sanctions such as withholding of payment, imposition of an employment program, finding the **Contractor** to be in default, cancellation of the **Contract**, or any other sanction or remedy provided by **Law** or **Contract**.

ARTICLE 37. LABOR LAW REQUIREMENTS

37.1 The **Contractor** shall strictly comply with all applicable provisions of the Labor Law, as

amended. Such compliance is a material term of this **Contract**.

37.2 The **Contractor** specifically agrees, as required by Labor Law Sections 220 and 220-d, as amended, that:

37.2.1 Hours of **Work**: No laborer, worker, or mechanic in the employ of the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by this **Contract** shall be permitted or required to work more than eight (8) hours in any one (1) **Day**, or more than five (5) **Days** in any one (1) week, except as provided in the Labor Law and in cases of extraordinary emergency including fire, flood, or danger to life or property, or in the case of national emergency when so proclaimed by the President of the United States of America.

37.2.2 In situations in which there are not sufficient laborers, workers, and mechanics who may be employed to carry on expeditiously the **Work** contemplated by this **Contract** as a result of such restrictions upon the number of hours and **Days** of labor, and the immediate commencement or prosecution or completion without undue delay of the **Work** is necessary for the preservation of the **Site** and/or for the protection of the life and limb of the persons using the same, such laborers, workers, and mechanics shall be permitted or required to work more than eight (8) hours in any one (1) **Day**; or five (5) **Days** in any one (1) week; provided, however, that upon application of any **Contractor**, the **Commissioner** shall have first certified to the Commissioner of Labor of the State of New York (hereinafter "Commissioner of Labor") that such public **Work** is of an important nature and that a delay in carrying it to completion would result in serious disadvantage to the public; and provided, further, that such Commissioner of Labor shall have determined that such an emergency does in fact exist as provided in Labor Law Section 220.2.

37.2.3 Failure of the **Commissioner** to make such a certification to the Commissioner of Labor shall not entitle the **Contractor** to damages for delay or for any cause whatsoever.

37.2.4 Prevailing Rate of Wages: The wages to be paid for a legal day's **Work** to laborers, workers, or mechanics employed upon the **Work** contemplated by this **Contract** or upon any materials to be used thereon shall not be less than the "prevailing rate of wage" as defined in Labor Law Section 220, and as fixed by the **Comptroller** in the attached Schedule of Wage Rates and in updated schedules thereof. The prevailing wage rates and supplemental benefits to be paid are those in effect at the time the **Work** is being performed.

37.2.5 Requests for interpretation or correction in the Information for Bidders includes all requests for clarification of the classification of trades to be employed in the performance of the **Work** under this **Contract**. In the event that a trade not listed in the **Contract** is in fact employed during the performance of this **Contract**, the **Contractor** shall be required to obtain from the **Agency** the prevailing wage rates and supplementary benefits for the trades used and to complete the performance of this **Contract** at the price at which the **Contract** was awarded.

37.2.6 Minimum Wages: Except for employees whose wage is required to be fixed pursuant to Labor Law Section 220, all persons employed by the **Contractor** and any **Subcontractor** in the manufacture or furnishing of the supplies, materials, or equipment, or the furnishing of work, labor, or services, used in the performance of this **Contract**, shall be paid, without subsequent deduction or rebate unless expressly authorized by **Law**, not less than the sum mandated by **Law**.

37.3 Working Conditions: No part of the **Work**, labor or services shall be performed or rendered by

the **Contractor** in any plants, factories, buildings or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of this **Contract**. Compliance with the safety, sanitary, and factory inspection **Laws** of the state in which the **Work** is to be performed shall be prima facie evidence of compliance with this Article 37.3.

37.4 Prevailing Wage Enforcement: The **Contractor** agrees to pay for all costs incurred by the **City** in enforcing prevailing wage requirements, including the cost of any investigation conducted by or on behalf of the **Agency** or the **Comptroller,** where the **City** discovers a failure to comply with any of the requirements of this Article 37 by the **Contractor** or its **Subcontractor(s)**. The **Contractor** also agrees that, should it fail or refuse to pay for any such investigation, the **Agency** is hereby authorized to deduct from a **Contractor's** account an amount equal to the cost of such investigation.

37.4.1 The Labor Law Section 220 and Section 220-d, as amended, provide that this **Contract** shall be forfeited and no sum paid for any **Work** done hereunder on a second conviction for willfully paying less than:

37.4.1(a) The stipulated prevailing wage scale as provided in Labor Law section 220, as amended, or

37.4.1(b) The stipulated minimum hourly wage scale as provided in Labor Law section 220-d, as amended.

37.4.2 For any breach or violation of either working conditions (Article 37.3) or minimum wages (Article 37.2.6) provisions, the party responsible therefor shall be liable to the **City** for liquidated damages, which may be withheld from any amounts due on any contracts with the **City** of such party responsible, or may be recovered in actions brought by the **City** Corporation Counsel in the name of the **City**, in addition to damages for any other breach of this **Contract**, for a sum equal to the amount of any underpayment of wages due to any employee engaged in the performance of this **Contract**. In addition, the **Commissioner** shall have the right to cancel contracts and enter into other contracts for the completion of the original contract, with or without public letting, and the original **Contractor** shall be liable for any additional cost. All sums withheld or recovered as deductions, rebates, refunds, or underpayment of wages hereunder, shall be held in a special deposit account and shall be paid without interest, on order of the **Comptroller**, directly to the employees who have been paid less than minimum rates of pay as set forth herein and on whose account such sums were withheld or recovered, provided that no claims by employees for such payments shall be entertained unless made within two (2) years from the date of actual notice to the **Contractor** of the withholding or recovery of such sums by the **City**.

37.4.3 A determination by the **Comptroller** that a **Contractor** and/or its **Subcontractor** willfully violated Labor Law Section 220 will be forwarded to the **City's** five District Attorneys for review.

37.4.4 The **Contractor's** or **Subcontractor's** noncompliance with this Article 37.4 and Labor Law Section 220 may result in an unsatisfactory performance evaluation and the **Comptroller** may also find and determine that the **Contractor** or **Subcontractor** willfully violated the New York Labor **Law**.

37.4.4(a) An unsatisfactory performance evaluation for noncompliance with this Article 37.4 may result in a determination that the **Contractor** is a non-responsible bidder on subsequent procurements with the **City** and thus a rejection of a future award

of a contract with the **City**, as well as any other sanctions provided for by **Law**.

37.4.4(b) Labor Law Section 220-b, as amended, provides that when two (2) final determinations have been rendered against a **Contractor** or **Subcontractor** within any consecutive six (6) year period determining that such **Contractor** or **Subcontractor** has willfully failed to pay the prevailing rate of wages or to provide supplements in accordance with the Labor Law and this Article 37.4, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public works projects are rendered simultaneously, such **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the second final determination. If the final determination involves the falsification of payroll records or the kickback of wages or supplements, the **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the first final determination.

37.4.4(c) Labor Law Section 220, as amended, provides that the **Contractor** or **Subcontractor** found to have violated this Article 37.4 may be directed to make payment of wages or supplements including interest found to be due, and the **Contractor** or **Subcontractor** may be directed to make payment of a further sum as a civil penalty in an amount not exceeding twenty-five (25%) percent of the total amount found to be due.

37.5 The **Contractor** and its **Subcontractors** shall within ten (10) **Days** after mailing of a Notice of Award or written order, post in prominent and conspicuous places in each and every plant, factory, building, and structure where employees of the **Contractor** and its **Subcontractors** engaged in the performance of this **Contract** are employed, notices furnished by the **City**, in relation to prevailing wages and supplements, minimum wages, and other stipulations contained in Sections 220 and 220-h of the Labor Law, and the **Contractor** and its **Subcontractors** shall continue to keep such notices posted in such prominent and conspicuous places until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services required to be furnished or rendered under this **Contract**.

37.6 The **Contractor** shall strictly comply with all of the provisions of Articles 37.6.1 through 37.6.5, and provide for all workers, laborers or mechanics in its employ, the following:

37.6.1 Notices Posted At **Site**: Post, in a location designated by the **City**, schedules of prevailing wages and supplements for this **Project**, a copy of all re-determinations of such schedules for the **Project**, the Workers' Compensation **Law** Section 51 notice, all other notices required by **Law** to be posted at the **Site**, the **City** notice that this **Project** is a public works project on which each worker is entitled to receive the prevailing wages and supplements for the occupation at which he or she is working, and all other notices which the **City** directs the **Contractor** to post. The **Contractor** shall provide a surface for such notices which is satisfactory to the **City**. The **Contractor** shall maintain and keep current such notices in a legible manner and shall replace any notice or schedule which is damaged, defaced, illegible or removed for any reason. The **Contractor** shall post such notices before commencing any **Work** on the **Site** and shall maintain such notices until all **Work** on the **Site** is complete; and

37.6.2 Daily **Site** Sign-in Sheets: Maintain daily **Site** sign-in sheets, and require that **Subcontractors** maintain daily **Site** sign-in sheets for its employees, which include blank spaces for an employee's name to be both printed and signed, job title, date started and Social Security number, the time the employee began work and the time the employee left

work, until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services to be furnished or rendered under this **Contract** unless exception is granted by the **Comptroller** upon application by the **Agency**. In the alternative, subject to the approval of the **CCPO**, the **Contractor** and **Subcontractor** may maintain an electronic or biometric sign-in system, which provides the information required by this Article 37.6.2; and

37.6.3 Individual Employee Information Notices: Distribute a notice to each worker, laborer or mechanic employed under this **Contract**, in a form provided by the **Agency**, that this **Project** is a public works project on which each worker, laborer or mechanic is entitled to receive the prevailing rate of wages and supplements for the occupation at which he orshe is working. If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, such notice shall also include a statement that each worker, laborer or mechanic must be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration. Such notice shall be distributed to each worker before he or she starts performing any **Work** of this **Contract** and with the first paycheck after July first of each year. "Worker, laborer or mechanic" includes employees of the **Contractor** and all **Subcontractors** and all employees of suppliers entering the **Site**. At the time of distribution, the **Contractor** shall have each worker, laborer or mechanic sign a statement, in a form provided by the **Agency**, certifying that the worker has received the notice required by this Article 37.6.3, which signed statement shall be maintained with the payroll records required by this **Contract**; and

37.6.3(a) The **Contractor** and each **Subcontractor** shall notify each worker, laborer or mechanic employed under this **Contract** in writing of the prevailing rate of wages for their particular job classification. Such notification shall be given to every worker, laborer, and mechanic on their first pay stub and with every pay stub thereafter; and

37.6.4 **Site** Laminated Identification Badges: The **Contractor** shall provide laminated identification badges which include a photograph of the worker's, laborer's or mechanic's face and indicate the worker's, laborer's or mechanic's name, trade, employer's name, and employment starting date (month/day/year). Further, the **Contractor** shall require as acondition of employment on the **Site**, that each and every worker, laborer or mechanic wear the laminated identification badge at all times and that it may be seen by any representative of the **City**. The **Commissioner** may grant a written waiver from the requirement that the laminated identification badge include a photograph if the **Contractor** demonstrates that the identity of an individual wearing a laminated identification badge can be easily verified by another method; and

37.6.5 Language Other Than English Used On **Site**: Provide the **ACCO** notice when three (3) or more employees (worker and/or laborer and/or mechanic) on the **Site**, at any time, speak a language other than English. The **ACCO** will then provide the **Contractor** the notices described in Article 37.6.1 in that language or languages as may be required. The **Contractor** is responsible for all distributions under this Article 37; and

37.6.6 Provision of Records: The **Contractor** and **Subcontractor(s)** shall produce within five (5) **Days** on the **Site** of the **Work** and upon a written order of the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, or the **Comptroller,** such records as are required to be kept by this Article 37.6; and

37.6.7 The **Contractor** and **Subcontractor(s)** shall pay employees by check or direct deposit. If this **Contract** is for an amount greater than one million ($1,000,000) dollars, checks issued by the **Contractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be used if approved by the **Agency**). For any subcontract for an amount greater than seven hundred fifty thousand ($750,000) dollars, checks issued by a **Subcontractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be usedif approved by the **Agency**); and

37.6.8 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 37.6.1 through 37.6.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

37.7 The **Contractor** and its **Subcontractors** shall keep such employment and payroll records as are required by Section 220 of the Labor Law. The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of this Article 37.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract.**

37.8 At the time the **Contractor** makes application for each partial payment and for final payment, the **Contractor** shall submit to the **Commissioner** a written payroll certification, in the form provided by this **Contract**, of compliance with the prevailing wage, minimum wage, and other provisions and stipulations required by Labor Law Section 220 and of compliance with the training requirements of Labor Law Section 220-h set forth in Article 35.2. This certification of compliance shall be a condition precedent to payment and no payment shall be made to the **Contractor** unless and until each such certification shall have been submitted to and received by the **Commissioner**.

37.9 This **Contract** is executed by the **Contractor** with the express warranty and representation that the **Contractor** is not disqualified under the provisions of Section 220 of the Labor Law from the award of the **Contract**.

37.10 Any breach or violation of any of the foregoing shall be deemed a breach or violation of a material provision of this **Contract**, and grounds for cancellation thereof by the **City**.

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain on the **Site** during the performanceof the **Work** the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii). The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts along with each and every payment requisition. If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both along with its payment requisitions and independently of its payment requisitions.

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the City.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law**

Investigator(s), or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

38.4 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 38.1 and/or 38.2 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

ARTICLE 39. DUST HAZARDS

39.1 Should a harmful dust hazard be created in performing the **Work** of this **Contract**, for the elimination of which appliances or methods have been approved by the Board of Standards and Appeals of the City of New York, such appliances and methods shall be installed, maintained, and effectively operated during the continuance of such harmful dust hazard. Failure to comply with this provision after notice shall make this **Contract** voidable at the sole discretion of the **City**.

CHAPTER IX: PARTIAL AND FINAL PAYMENTS

ARTICLE 40. CONTRACT PRICE

40.1 The **City** shall pay, and the **Contractor** agrees to accept, in full consideration for the **Contractor's** performance of the **Work** subject to the terms and conditions hereof, the lump sum price or unit prices for which this **Contract** was awarded, plus the amount required to be paid for any **Extra Work** ordered by the **Commissioner** under Article 25, less credit for any **Work** omitted pursuant to Article 29.

ARTICLE 41. BID BREAKDOWN ON LUMP SUM

41.1 Within fifteen (15) **Days** after the commencement date specified in the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Resident Engineer**, the **Contractor** shall submit to the **Resident Engineer** a breakdown of its bid price, or of lump sums bid for items of the **Contract**, showing the various operations to be performed under the **Contract**, as directed in the progress schedule required under Article 9, and the value of each of such operations, the total of such items to equal the lump sum price bid. Said breakdown must be approved in writing by the **Resident Engineer**.

41.2 No partial payment will be approved until the **Contractor** submits a bid breakdown that is acceptable to the **Resident Engineer**.

41.3 The **Contractor** shall also submit such other information relating to the bid breakdown as directed by the **Resident Engineer**. Thereafter, the breakdown may be used only for checking the **Contractor's** applications for partial payments hereunder, but shall not be binding upon the **City**, the **Commissioner**, or the **Engineer** for any purpose whatsoever.

ARTICLE 42. PARTIAL PAYMENTS

42.1 From time to time as the **Work** progresses satisfactorily, but not more often than once each calendar month (except where the **Commissioner** approves in writing the submission of invoices on a more frequent basis and for invoices relating to **Work** performed pursuant to a change order), the **Contractor** may submit to the **Engineer** a requisition for a partial payment in the prescribed form, which shall contain an estimate of the quantity and the fair value of the **Work** done during the payment period.

42.2 Partial payments may be made for materials, fixtures, and equipment in advance of their actual incorporation in the **Work**, as the **Commissioner** may approve, and upon the terms and conditions set forth in the General Conditions.

42.3 The **Contractor** shall also submit to the **Commissioner** in connection with every application for partial payment a verified statement in the form prescribed by the **Comptroller** setting forth the information required under Labor Law Section 220-a.

42.4 Within thirty (30) **Days** after receipt of a satisfactory payment application, and within sixty (60) **Days** after receipt of a satisfactory payment application in relation to **Work** performed pursuant to a change order, the **Engineer** will prepare and certify, and the **Commissioner** will approve, a voucher for a partial payment in the amount of such approved estimate, less any and all deductions authorized to be made by the **Commissioner** under the terms of this **Contract** or by **Law**.

ARTICLE 43. PROMPT PAYMENT

43.1 The Prompt Payment provisions of the **PPB** Rules in effect at the time of the bid will be applicable to payments made under this **Contract**. The provisions require the payment to the **Contractor** of interest on payments made after the required payment date, except as set forth in the **PPB** Rules.

43.2 The **Contractor** shall submit a proper invoice to receive payment, except where the **Contract** provides that the **Contractor** will be paid at predetermined intervals without having to submit an invoice for each scheduled payment.

43.3 Determination of interest due will be made in accordance with the **PPB** Rules.

43.4 If the **Contractor** is paid interest, the proportionate share(s) of that interest shall be forwarded by the **Contractor** to its **Subcontractor(s)**.

43.5 The **Contractor** shall pay each **Subcontractor** or **Materialman** not later than seven (7) **Days** after receipt of payment out of amounts paid to the **Contractor** by the **City** for **Work** performed by the **Subcontractor** or **Materialman** under this **Contract**.

43.5.1 If **Contractor** fails to make any payment to any **Subcontractor** or **Materialman** within seven (7) **Days** after receipt of payment by the **City** pursuant to this Article 43.5,

then the **Contractor** shall pay interest on amounts due to such **Subcontractor** or **Materialman** at the rate of interest in effect on the date such payment is made by the **Contractor** computed in accordance with Section 756-b (1)(b) of the New York General Business Law. Accrual of interest shall commence on the **Day** immediately following the expiration of the seventh **Day** following receipt of payment by the **Contractor** from the **City** and shall end on the date on which payment is made.

43.6 The **Contractor** shall include in each of its subcontracts a provision requiring each **Subcontractor** to make payment to each of its **Subcontractors** or **Materialmen** for **Work** performed under this **Contract** in the same manner and within the same time period set forth above.

ARTICLE 44. SUBSTANTIAL COMPLETION PAYMENT

44.1 The **Contractor** shall submit with the **Substantial Completion** requisition:

44.1.1 A final verified statement of any pending Article 27 disputes in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay.

44.1.1(a) With respect to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 44.1.1(a) is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor** upon acceptance of the **Substantial Completion** payment pursuant to this Article 44, will have waived any such claims.

44.1.2 A **Final Approved Punch List**.

44.1.3 Where required, a request for an extension of time to achieve **Substantial Completion** or final extension of time.

44.2 The **Commissioner** shall issue a voucher calling for payment of any part or all of the balance due for **Work** performed under the **Contract**, including monies retained under Article 21, less any and all deductions authorized to be made by the **Commissioner**, under this **Contract** or by **Law**, and less twice the amount the **Commissioner** considers necessary to ensure the completion of the balance of the **Work** by the **Contractor**. Such a payment shall be considered a partial and not a final payment. No **Substantial Completion** payment shall be made under this Article 44 where the **Contractor** failed to complete the **Work** within the time fixed for such completion in the Schedule A of the General Conditions, or within the time to which completion may have been extended, until an extension or extensions of time for the completion of **Work** have been acted upon pursuant to Article 13.

44.3 No further partial payments shall be made to the **Contractor** after **Substantial Completion**, except the **Substantial Completion** payment and payment pursuant to any **Contractor's** requisition that were properly filed with the **Commissioner** prior to the date of **Substantial Completion**; however, the **Commissioner** may grant a waiver for further partial payments after the date of **Substantial Completion** to permit payments for change order **Work** and/or release of retainage and deposits pursuant to Articles 21 and 24. Such waiver shall be in writing.

44.4 The **Contractor** acknowledges that nothing contained in this Article 44 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 45. FINAL PAYMENT

45.1 After completion and **Final Acceptance** of the **Work**, the **Contractor** shall submit all required certificates and documents, together with a requisition for the balance claimed to be due under the **Contract**, less the amount authorized to be retained for maintenance under Article 24. Such submission shall be within 90 days of the date of the **Commissioner's** written determination of **Final Acceptance**, or within such additional time as may be granted by the **Commissioner** in writing. If the **Contractor** fails to submit all required certificates and documents within the time allowed, no payment of the balance claimed shall be made to the **Contractor** and the **Contractor** shall be deemed to have forfeited its right to payment of any balance claimed. A verified statement similar to that required in connection with applications for partial payments shall also be submitted to the **Commissioner**.

45.2 Amended Verified Statement of Claims: The **Contractor** shall also submit with the final requisition any amendments to the final verified statement of any pending dispute resolution procedures in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) that have occurred subsequent to **Substantial Completion**, setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each such item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay. With reference to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 45.2, is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor**, upon acceptance of the Final Payment pursuant to Article 46, will have waived any such claims.

45.3 Preparation of Final Voucher: Upon determining the balance due hereunder other than on account of claims, the **Engineer** will prepare and certify, for the Commissioner's approval, a voucher for final payment in that amount less any and all deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**. In the case of a lump sum **Contract**, the **Commissioner** shall certify the voucher for final payment within thirty (30) **Days** from the date of completion and acceptance of the **Work**, provided all requests for extensions of time have been acted upon.

45.3.1 All prior certificates and vouchers upon which partial payments were made, being merely estimates made to enable the **Contractor** to prosecute the **Work** more advantageously, shall be subject to correction in the final voucher, and the certification of the **Engineer**

thereon and the approval of the **Commissioner** thereof, shall be conditions precedent to the right of the **Contractor** to receive any money hereunder. Such final voucher shall be binding and conclusive upon the **Contractor**.

45.3.2 Payment pursuant to such final voucher, less any deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**, shall constitute the final payment, and shall be made by the **Comptroller** within thirty (30) **Days** after the filing of such voucher in his/her office.

45.4 The **Contractor** acknowledges that nothing contained in this Article 45 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 46. ACCEPTANCE OF FINAL PAYMENT

46.1 The acceptance by the **Contractor**, or by anyone claiming by or through it, of the final payment, whether such payment be made pursuant to any judgment of any court, or otherwise, shall constitute and operate as a release of the **City** from any and all claims of and liability to the **Contractor** for anything heretofore done or furnished for the **Contractor** relating to or arising out of this **Contract** and the **Work** done hereunder, and for any prior act, neglect or default on the part of the **City** or any of its officials, agents or employees, excepting only a claim against the **City** for the amounts deducted or retained in accordance with the terms and provisions of this **Contract** or by **Law**, and excepting any claims, not otherwise waived, or any pending dispute resolution procedures which are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44and 45.

46.2 The **Contractor** is warned that the execution by it of a release, in connection with the acceptance of the final payment, containing language purporting to reserve claims other than those herein specifically excepted from the operation of this Article 46, or those for amounts deducted by the **Commissioner** from the final requisition or from the final payment as certified by the **Engineer** and approved by the **Commissioner**, shall not be effective to reserve such claims, anything stated to the **Contractor** orally or in writing by any official, agent or employee of the **City** to the contrary notwithstanding.

46.3 Should the **Contractor** refuse to accept the final payment as tendered by the **Comptroller**, it shall constitute a waiver of any right to interest thereon.

46.4 The **Contractor**, however, shall not be barred by this Article 46 from commencing an action for breach of **Contract** to the extent permitted by **Law** and by the terms of the **Contract** for any claims that are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44 and 45 or that arose after submission of the final payment requisition, provided that a detailed and verified statement of claim is served upon the contracting **Agency** and **Comptroller** not later than forty (40) **Days** after the making of such final payment by electronic funds transfer (EFT)or the mailing of such final payment. The statement shall specify the items upon which the claim will be based and any such claim shall be limited to such items.

ARTICLE 47. APPROVAL BY PUBLIC DESIGN COMMISSION

47.1 All works of art, including paintings, mural decorations, stained glass, statues, bas-reliefs, and other sculptures, monuments, fountains, arches, and other structures of a permanent character intendedfor ornament or commemoration, and every design of the same to be used in the performance of this **Contract**, and the design of all bridges, approaches, buildings, gates, fences, lamps, or structures to be erected, pursuant

to the terms of this **Contract**, shall be submitted to the Art Commission, d/b/a the Public Design Commission of the City of New York, and shall be approved by the Public Design Commission prior to the erection or placing in position of the same. The final payment shall not become due or payable under this **Contract** unless and until the Public Design Commission shall certify that the design for the **Work** herein contracted for has been approved by the said Public Design Commission, and that the same has been executed in substantial accordance with the design so approved, pursuant to the provisions of Chapter 37, Section 854 of the **City** Charter, as amended.

CHAPTER X: CONTRACTOR'S DEFAULT

ARTICLE 48. COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT

48.1 In addition to those instances specifically referred to in other Articles herein, the **Commissioner** shall have the right to declare the **Contractor** in default of this **Contract** if:

48.1.1 The **Contractor** fails to commence **Work** when notified to do so by the **Commissioner**; or if

48.1.2 The **Contractor** shall abandon the **Work**; or if

48.1.3 The **Contractor** shall refuse to proceed with the **Work** when and as directed by the **Commissioner**; or if

48.1.4 The **Contractor** shall, without just cause, reduce its working force to a number which, if maintained, would be insufficient, in the opinion of the **Commissioner**, to complete the **Work** in accordance with the progress schedule; or if

48.1.5 The **Contractor** shall fail or refuse to increase sufficiently such working force when ordered to do so by the **Commissioner**; or if

48.1.6 The **Contractor** shall sublet, assign, transfer, convert or otherwise dispose of this **Contract** other than as herein specified; or sell or assign a majority interest in the **Contractor**; or if

48.1.7 The **Contractor** fails to secure and maintain all required insurance; or if

48.1.8 A receiver or receivers are appointed to take charge of the **Contractor's** property or affairs; or if

48.1.9 The **Commissioner** shall be of the opinion that the **Contractor** is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the **Work**, or the award of necessary subcontracts, or the placing of necessary material and equipment orders; or if

48.1.10 The **Commissioner** shall be of the opinion that the **Contractor** is or has been willfully or in bad faith violating any of the provisions of this **Contract**; or if

48.1.11 The **Commissioner** shall be of the opinion that the **Work** cannot be completed within the time herein provided therefor or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the

Commissioner's opinion, attributable to conditions within the **Contractor's** control; orif

48.1.12 The **Work** is not completed within the time herein provided therefor or within the time to which the **Contractor** may be entitled to have such completion extended; or if

48.1.13 Any statement or representation of the **Contractor** in the **Contract** or in any document submitted by the **Contractor** with respect to the **Work**, the **Project**, or the **Contract** (or for purposes of securing the **Contract**) was untrue or incorrect when made; or if

48.1.14 The **Contractor** or any of its officers, directors, partners, five (5%) percent shareholders, principals, or other persons substantially involved in its activities, commits any of the acts or omissions specified as the grounds for debarment in the **PPB** Rules.

48.2 Before the **Commissioner** shall exercise his/her right to declare the **Contractor** in default, the **Commissioner** shall give the **Contractor** an opportunity to be heard, upon not less than two (2) **Days**' notice.

ARTICLE 49. EXERCISE OF THE RIGHT TO DECLARE DEFAULT

49.1 The right to declare the **Contractor** in default for any of the grounds specified or referred to in Article 48 shall be exercised by sending the **Contractor** a notice, signed by the **Commissioner**, setting forth the ground or grounds upon which such default is declared (hereinafter referred to as a "Notice of Default").

49.2 The **Commissioner's** determination that the **Contractor** is in default shall be conclusive, final, and binding on the parties and such a finding shall preclude the **Contractor** from commencing a plenary action for any damages relating to the **Contract**. If the **Contractor** protests the determination of the **Commissioner**, the **Contractor** may commence an action in a court of competent jurisdiction of the State of New York under Article 78 of the New York Civil Practice Law and Rules.

ARTICLE 50. QUITTING THE SITE

50.1 Upon receipt of such notice the **Contractor** shall immediately discontinue all further operations under this **Contract** and shall immediately quit the **Site**, leaving untouched all plant, materials, equipment, tools, and supplies then on the **Site**.

ARTICLE 51. COMPLETION OF THE WORK

51.1 The **Commissioner**, after declaring the **Contractor** in default, may then have the **Work** completed by such means and in such manner, by contract with or without public letting, or otherwise, as he/she may deem advisable, utilizing for such purpose such of the **Contractor's** plant, materials, equipment, tools, and supplies remaining on the **Site**, and also such **Subcontractors**, as he/she may deem advisable.

51.2 After such completion, the **Commissioner** shall make a certificate stating the expense incurred in such completion, which shall include the cost of re-letting and also the total amount of liquidated damages (at the rate provided for in the **Contract**) from the date when the **Work** should have been completed by the **Contractor** in accordance with the terms hereof to the date of actual completion of the **Work**. Such certificate shall be binding and conclusive upon the **Contractor**, its sureties, and any person claiming under the **Contractor**, as to the amount thereof.

51.3 The expense of such completion, including any and all related and incidental costs, as so certified by the **Commissioner**, and any liquidated damages assessed against the **Contractor**, shall be charged against and deducted out of monies which are earned by the **Contractor** prior to the date of default. Should the expense of such completion, as certified by the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

ARTICLE 52. PARTIAL DEFAULT

52.1 In case the **Commissioner** shall declare the **Contractor** in default as to a part of the **Work** only, the **Contractor** shall discontinue such part, shall continue performing the remainder of the **Work** in strict conformity with the terms of this **Contract**, and shall in no way hinder or interfere with any **Other Contractor(s)** or persons whom the **Commissioner** may engage to complete the **Work** as to which the **Contractor** was declared in default.

52.2 The provisions of this Chapter relating to declaring the **Contractor** in default as to the entire **Work** shall be equally applicable to a declaration of partial default, except that the **Commissioner** shall be entitled to utilize for completion of the part of the **Work** as to which the **Contractor** was declared in default only such plant, materials, equipment, tools, and supplies as had been previously used by the **Contractor** on such part.

ARTICLE 53. PERFORMANCE OF UNCOMPLETED WORK

53.1 In completing the whole or any part of the **Work** under the provisions of this Chapter X, the **Commissioner** shall have the power to depart from or change or vary the terms and provisions of this **Contract**, provided, however, that such departure, change or variation is made for the purpose of reducing the time or expense of such completion. Such departure, change or variation, even to the extent of accepting a lesser or different performance, shall not affect the conclusiveness of the **Commissioner's** certificate of the cost of completion referred to in Article 51, nor shall it constitute a defense to an action to recover the amount by which such certificate exceeds the amount which would have been payable to the **Contractor** hereunder but for its default.

ARTICLE 54. OTHER REMEDIES

54.1 In addition to the right to declare the **Contractor** in default pursuant to this Chapter X, the **Commissioner** shall have the absolute right, in his/her sole discretion and without a hearing, to complete or cause to be completed in the same manner as described in Articles 51 and 53, any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List**. A written notice of the exercise of this right shall be sent to the **Contractor** who shall immediately quit the **Site** in accordance with the provisions of Article 50.

54.2 The expense of completion permitted under Article 54.1, including any and all related and incidental costs, as so certified by the **Commissioner**, shall be charged against and deducted out of monies which have been earned by the **Contractor** prior to the date of the exercise of the right set forth in Article 54.1; the balance of such monies, if any, subject to the other provisions of this **Contract**, to be paid to the **Contractor** without interest after such completion. Should the expense of such completion, as certified by

the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

54.3 The previous provisions of this Chapter X shall be in addition to any and all other remedies available under **Law** or in equity.

54.4 The exercise by the **City** of any remedy set forth herein shall not be deemed a waiver by the **City** of any other legal or equitable remedy contained in this **Contract** or provided under **Law**.

CHAPTER XI: MISCELLANEOUS PROVISIONS

ARTICLE 55. CONTRACTOR'S WARRANTIES

55.1 In consideration of, and to induce, the award of this **Contract** to the **Contractor**, the **Contractor** represents and warrants:

55.1.1 That it is financially solvent, sufficiently experienced and competent to performthe **Work**; and

55.1.2 That the facts stated in its bid and the information given by it pursuant to the Information for Bidders is true and correct in all respects; and

55.1.3 That it has read and complied with all requirements set forth in the **Contract**.

ARTICLE 56. CLAIMS AND ACTIONS THEREON

56.1 Any claim, that is not subject to dispute resolution under the **PPB** Rules or this **Contract**, against the **City** for damages for breach of **Contract** shall not be made or asserted in any action, unless the **Contractor** shall have strictly complied with all requirements relating to the giving of notice and of information with respect to such claims, as herein before provided.

56.2 Nor shall any action be instituted or maintained on any such claims unless such action is commenced within six (6) months after **Substantial Completion**; except that:

56.2.1 Any claims arising out of events occurring after **Substantial Completion** and before **Final Acceptance** of the **Work** shall be asserted within six (6) months of **Final Acceptance** of the **Work**;

56.2.2 If the **Commissioner** exercises his/her right to complete or cause to complete any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List** pursuant to Article 54, any such action shall be commenced within six (6) months from the date the **Commissioner** notifies the **Contractor** in writing that he/she has exercised such right. Any claims for monies deducted, retained or withheld under the provisions of this **Contract** shall be assertedwithin six (6) months after the date when such monies otherwise become due and payable hereunder; and

56.2.3 If the **Commissioner** exercises his/her right to terminate the **Contract** pursuant to Article 64, any such action shall be commenced within six (6) months of the date the **Commissioner** exercises said right.

ARTICLE 57. INFRINGEMENT

57.1 The **Contractor** shall be solely responsible for and shall defend, indemnify, and hold the **City** harmless from any and all claims (even if the allegations of the lawsuit are without merit) and judgments for damages and from costs and expenses to which the **City** may be subject to or which it may suffer or incur allegedly arising out of or in connection with any infringement by the **Contractor** of any copyright, trade secrets, trademark or patent rights or any other property or personal right of any third party by the **Contractor** and/or its **Subcontractors** in the performance or completion of the **Work**. Insofar as the facts or **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent permitted by **Law**.

ARTICLE 58. NO CLAIM AGAINST OFFICIALS, AGENTS OR EMPLOYEES

58.1 No claim whatsoever shall be made by the **Contractor** against any official, agent or employee of the **City** for, or on account of, anything done or omitted to be done in connection with this **Contract**.

ARTICLE 59. SERVICE OF NOTICES

59.1 The **Contractor** hereby designates the business address, fax number, and email address specified in its bid, as the place where all notices, directions or other communications to the **Contractor** may be delivered, or to which they may be mailed. Any notice, direction, or communication from either party to the other shall be in writing and shall be deemed to have been given when (i) delivered personally; (ii) sent by certified mail, return receipt requested; (iii) delivered by overnight or same day courier service in a properly addressed envelope with confirmation; or (iv) sent by fax or email and, unless receipt of the fax or e-mail is acknowledged by the recipient by fax or e-mail, deposited in a post office box regularly maintained by the United States Postal Service in a properly addressed, postage pre- paid envelope.

59.2 **Contractor's** notice address, email address, or fax number may be changed at any time by an instrument in writing, executed and acknowledged by the **Contractor**, and delivered to the **Commissioner**.

59.3 Nothing herein contained shall, however, be deemed to preclude or render inoperative the service of any notice, direction or other communication upon the **Contractor** personally, or, if the **Contractor** is a corporation, upon any officer thereof.

ARTICLE 60. UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT

60.1 If this **Contract** contains any unlawful provision not an essential part of the **Contract** and which shall not appear to have been a controlling or material inducement to the making thereof, the same shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the **Contract** without affecting the binding force of the remainder.

ARTICLE 61. ALL LEGAL PROVISIONS DEEMED INCLUDED

61.1 It is the intent and understanding of the parties to this **Contract** that each and every provision of **Law** required to be inserted in this **Contract** shall be and is inserted herein. Furthermore, it is hereby stipulated that every such provision is to be deemed to be inserted herein, and if, through mistake or otherwise, any such provision is not inserted, or is not inserted in correct form, then this **Contract** shall forthwith upon the application of either party be amended by such insertion so as to comply strictly with the **Law** and without prejudice to the rights of either party hereunder.

ARTICLE 62. TAX EXEMPTION

62.1 The **City** is exempt from payment of Federal, State, and local taxes, including sales and compensating use taxes of the State of New York and its cities and counties on all tangible personal property sold to the **City** pursuant to the provisions of this **Contract**. These taxes are not to be included in bids. However, this exemption does not apply to tools, machinery, equipment or other property leased by or to the **Contractor**, **Subcontractor** or **Materialman** or to tangible personal property which, even though it is consumed, is not incorporated into the completed **Work** (consumable supplies) and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**. The **Contractor** and its **Subcontractors** and **Materialmen** shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**.

62.2 The **Contractor** agrees to sell and the **City** agrees to purchase all tangible personal property, other than consumable supplies and other tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**, that is required, necessary or proper for or incidental to the construction of the **Project** covered by this **Contract**. The sum paid under this **Contract** for such tangible personal property shall be in full payment and consideration for the sale of such tangible personal property.

62.2.1 The **Contractor** agrees to construct the **Project** and to perform all **Work**, labor and services rendered, necessary, proper or incidental thereto for the sum shown in the bid forthe performance of such **Work**, labor, and services, and the sum so paid pursuant to this **Contract** for such **Work**, labor, and services, shall be in full consideration for the performance by the **Contractor** of all its duties and obligations under this **Contract** in connection with said **Work,** labor, and services.

62.3 20 NYCRR Section 541.3(d) provides that a **Contractor**'s purchases of tangible personal property that is either incorporated into real property owned by a governmental entity or purchased for and sold to a governmental entity are exempt from sales and use tax. The **City** shall not pay sales tax for any such tangible personal property that it purchases from the **Contractor** pursuant to the **Contract.** With respect to such tangible personal property, the **Contractor**, at the request of the **City**, shall furnish to the **City** such bills of sale and other instruments as may be required by the **City**, properly executed, acknowledged and delivered assuring to the **City** title to such tangible personal property, free of liens and/or encumbrances, and the **Contractor** shall mark or otherwise identify all such tangible personal property as the property of the **City**.

62.4 Title to all tangible personal property to be sold by the **Contractor** to the **City** pursuant to the provisions of the **Contract** shall immediately vest in and become the sole property of the **City** upon delivery of such tangible personal property to the **Site**. Notwithstanding such transfer of title, the **Contractor** shall

have the full and continuing responsibility to install such tangible personal property in accordance with the provisions of this **Contract**, protect it, maintain it in a proper condition and forthwith repair, replace and make good any damage thereto, theft or disappearance thereof, and furnish additional tangible personal property in place of any that may be lost, stolen or rendered unusable, without cost to the **City**, until such time as the **Work** covered by the **Contract** is fully accepted by the **City**. Such transfer of title shall in no way affect any of the **Contractor's** obligations hereunder. In the event that, after title has passed to the **City**, any of the tangible personal property is rejected as being defective or otherwise unsatisfactory, title to all such tangible personal property shall be deemed to have been transferred back to the **Contractor**.

62.5 The purchase by **Subcontractors** or **Materialmen** of tangible personal property to be sold hereunder shall be a purchase or procurement for resale to the **Contractor** (either directly or through other **Subcontractors**) and therefore not subject to the aforesaid sales and compensating use taxes, provided that the subcontracts and purchase agreements provide for the resale of such tangible personal property and that such subcontracts and purchase agreements are in a form similar to this **Contract** with respect to the separation of the sale of consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work** from the **Work** and labor, services, and any other matters to be provided, and provided further that the subcontracts and purchase agreements provide separate prices for tangible personal property and all other services and matters. Such separation shall actually be followed in practice, including the separation of payments for tangible personal property from the payments for other **Work** and labor and other things to be provided.

62.6 The **Contractor** and its **Subcontractors** and **Materialmen** shall furnish a **Contractor** Exempt Purchase Certificate to all persons, firms or corporations from which they purchase tangible personal property for the performance of the **Work** covered by this **Contract**.

62.7 In the event any of the provisions of this Article 62 shall be deemed to be in conflict with any other provisions of this **Contract** or create any ambiguity, then the provisions of this Article 62 shall control.

ARTICLE 63. INVESTIGATION(S) CLAUSE

63.1 The parties to this **Contract** agree to cooperate fully and faithfully with any investigation, audit or inquiry conducted by a United States, a State of New York (State) or a **City** governmental agency or authority that is empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath, or conducted by the Inspector General of a governmental agency that is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit or license that is the subject of the investigation, audit or inquiry.

63.2 If any person who has been advised that his/her statement, and any information from such statement, will not be used against him/her in any subsequent criminal proceeding refuses to testify before a grand jury or other governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath concerning the award of or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision or public authority thereof, or the Port Authority of NewYork and New Jersey, or any local development corporation within the **City**, or any public benefit corporation organized under the **Laws** of the State of New York, or;

63.3 If any person refuses to testify for a reason other than the assertion of his/her privilege against self incrimination in an investigation, audit or inquiry conducted by a **City** or State governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to take testimony under oath, or by the Inspector General of the governmental agency that is a party in interestin, and is

seeking testimony concerning the award of, or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision thereof or any local development corporation within the **City**, then;

63.4 The **Commissioner** whose **Agency** is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit, or license shall convene a hearing, upon not less than five (5) **Days**' written notice to the parties involved to determine if any penalties should attach for the failure of a person to testify.

63.5 If any non-governmental party to the hearing requests an adjournment, the **Commissioner** who convened the hearing may, upon granting the adjournment, suspend any contract, lease, permit, or license, pending the final determination pursuant to Article 63.7 without the **City** incurring any penalty or damages for delay or otherwise.

63.6 The penalties which may attach after a final determination by the **Commissioner** may include but shall not exceed:

63.6.1 The disqualification for a period not to exceed five (5) years from the date of an adverse determination for any person, or any entity of which such person was a member at the time the testimony was sought, from submitting bids for, or transacting business with, or entering into or obtaining any contract, lease, permit or license with or from the **City**; and/or

63.6.2 The cancellation or termination of any and all such existing **City** contracts, leases, permits or licenses that the refusal to testify concerns and that have not been assigned as permitted under this **Contract**, nor the proceeds of which pledged, to an unaffiliated and unrelated institutional lender for fair value prior to the issuance of the notice scheduling the hearing, without the **City** incurring any penalty or damages on account of such cancellation or termination; monies lawfully due for goods delivered, work done, rentals, or fees accrued prior to the cancellation or termination shall be paid by the **City**.

63.7 The **Commissioner** shall consider and address in reaching his/her determination and inassessing an appropriate penalty the factors in Articles 63.7.1 and 63.7.2. The **Commissioner** may also consider, if relevant and appropriate, the criteria established in Articles 63.7.3 and 63.7.4, in addition to any other information which may be relevant and appropriate:

63.7.1 The party's good faith endeavors or lack thereof to cooperate fully and faithfully with any governmental investigation or audit, including but not limited to the discipline, discharge, or disassociation of any person failing to testify, the production of accurate and complete books and records, and the forthcoming testimony of all other members, agents, assignees or fiduciaries whose testimony is sought.

63.7.2 The relationship of the person who refused to testify to any entity that is a party tothe hearing, including but not limited to, whether the person whose testimony is sought has an ownership interest in the entity and/or the degree of authority and responsibility theperson has within the entity.

63.7.3 The nexus of the testimony sought to the subject entity and its contracts, leases, permits or licenses with the **City**.

63.7.4 The effect a penalty may have on an unaffiliated and unrelated party or entity thathas a significant interest in an entity subject to penalties under Article 63.6, provided that the party

or entity has given actual notice to the **Commissioner** upon the acquisition of the interest, or at the hearing called for in Article 63.4, gives notice and proves that such interest was previously acquired. Under either circumstance the party or entity shall present evidence at the hearing demonstrating the potential adverse impact a penalty will have on such person or entity.

63.8 Definitions:

63.8.1 The term "license" or "permit" as used in this Article 63 shall be defined as a license, permit, franchise or concession not granted as a matter of right.

63.8.2 The term "person" as used in this Article 63 shall be defined as any natural person doing business alone or associated with another person or entity as a partner, director, officer, principal or employee.

63.8.3 The term "entity" as used in this Article 63 shall be defined as any firm, partnership, corporation, association, joint venture, or person that receives monies, benefits, licenses, leases, or permits from or through the **City** or otherwise transacts business with the **City**.

63.8.4 The term "member" as used in this Article 63 shall be defined as any person associated with another person or entity as a partner, director, officer, principal or employee.

63.9 In addition to and notwithstanding any other provision of this **Contract**, the **Commissioner** may in his/her sole discretion terminate this **Contract** upon not less than three (3) **Days'** written notice in the event the **Contractor** fails to promptly report in writing to the **Commissioner** of the Department of Investigations ("DOI") of the **City** any solicitation of money, goods, requests for future employment or other benefit or thing of value, by or on behalf of any employee of the **City** or other person, firm, corporation or entity for any purpose which may be related to the procurement or obtaining of this **Contract** by the **Contractor**, or affecting the performance of this **Contract**.

ARTICLE 64. TERMINATION BY THE CITY

64.1 In addition to termination pursuant to any other article of this **Contract**, the **Commissioner** may, at any time, terminate this **Contract** by written notice to the **Contractor**. In the event of termination, the **Contractor** shall, upon receipt of such notice, unless otherwise directed by the **Commissioner**:

64.1.1 Stop **Work** on the date specified in the notice;

64.1.2 Take such action as may be necessary for the protection and preservation of the **City's** materials and property;

64.1.3 Cancel all cancelable orders for material and equipment;

64.1.4 Assign to the **City** and deliver to the **Site** or another location designated by the **Commissioner**, any non-cancelable orders for material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract** and not incorporated in the **Work**;

64.1.5 Take no action which will increase the amounts payable by the **City** under this
64.1.5 **Contract**.

64.2 In the event of termination by the **City** pursuant to this Article 64, payment to the **Contractor** shall be in accordance with Articles 64.2.1, 64.2.2 or 64.2.3, to the extent that each respective article applies.

64.2.1 Lump Sum Contracts or Items: On all lump sum **Contracts**, or on lump sum items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.1(a) and 64.2.1(b), less all payments previously made pursuant to this **Contract**. On lump sum **Contracts** only, the **City** will also pay the **Contractor** an additional sum as provided in Article 64.2.1(c).

64.2.1(a) For **Work** completed prior to the notice of termination, the **Contractor** shall be paid a pro rata portion of the lump sum bid amount, plus approved change orders, based upon the percent completion of the **Work**, as determined by the **Commissioner**. For the purpose of determining the pro rata portion of the lump sum bid amount to which the **Contractor** is entitled, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be dispositive. The **Commissioner's** determination hereunder shall be final, binding, and conclusive.

64.2.1(b) For non-cancelable material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated in the **Work**, the **Contractor** shall be paid the lesser of the following, less salvage value:

64.2.1(b)(i) The Direct Cost, as defined in Article 64.2.4; or

64.2.1(b)(ii) The fair and reasonable value, if less than Direct Cost, of such material and equipment, plus necessary and reasonable delivery costs.

64.2.1(b)(iii) In addition, the **Contractor** shall be paid five (5%) percent of the amount described in Article 64.2.1(b)(i) or Article 64.2.1(b)(ii), whichever applies.

64.2.1(c) Except as otherwise provided in Article 64.2.1(d), on all lump sum **Contracts**, the **Contractor** shall be paid the percentage indicated below applied tothe difference between the total lump sum bid amount and the total of all payments made prior to the notice of termination plus all payments allowed pursuant to Articles 64.2.1(a) and 64.2.1(b):

64.2.1(c)(i) Five (5%) percent of the first five million ($5,000,000) dollars; and

64.2.1(c)(ii) Three (3%) percent of any amount between five million ($5,000,000) dollars and fifteen million ($15,000,000) dollars; plus

64.2.1(c)(iii) One (1%) percent of any amount over fifteen million ($15,000,000) dollars.

64.2.1(d) In the event the **City** terminates a lump sum **Contract** pursuant to this Article 64 within ninety (90) **Days** after registration of the **Contract** with the **Comptroller**, the **Contractor** shall be paid one (1%) percent of the difference between the lump sum bid amount and the total of all payments made pursuant to this Article 64.2.

64.2.2 Unit Price Contracts or Items: On all unit price **Contracts**, or on unit price items ina

Contract, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.2(a) and 64.2.2(b), less all payments previously made pursuant to this **Contract**:

64.2.2(a) For all completed units, the unit price stated in the **Contract**, and

64.2.2(b) For units that have been ordered but are only partially completed, the **Contractor** will be paid:

64.2.2(b)(i) A pro rata portion of the unit price stated in the **Contract** based upon the percent completion of the unit and

64.2.2(b)(ii) For non-cancelable material and equipment, payment willbe made pursuant to Article 64.2.1(b).

64.2.3 Time and Materials Contracts or Items Based on Time and Material Records: On all **Contracts** or items in a **Contract** where payment for the **Work** is based on time and material records, the **Contractor** shall be paid in accordance with Article 26, less all payments previously made pursuant to this **Contract**.

64.2.4 Direct Costs: Direct Costs as used in this Article 64.2 shall mean:

64.2.4(a) The actual purchase price of material and equipment, plus necessary and reasonable delivery costs,

64.2.4(b) The actual cost of labor involved in construction and installation at the **Site**, and

64.2.4(c) The actual cost of necessary bonds and insurance purchased pursuant to requirements of this **Contract** less any amounts that have been or should be refunded by the **Contractor's** sureties or insurance carriers.

64.2.4(d) Direct Costs shall not include overhead.

64.3 In no event shall any payments under this Article 64 exceed the **Contract** price for such items.

64.4 All payments pursuant to Article 64 shall be in the nature of liquidated damages and shall be accepted by the **Contractor** in full satisfaction of all claims against the **City**.

64.5 The **City** may deduct or set off against any sums due and payable pursuant to this Article 64, any deductions authorized by this **Contract** or by **Law** (including but not limited to liquidated damages) and any claims it may have against the **Contractor**. The **City's** exercise of the right to terminate the **Contract** pursuant to this Article 64 shall not impair or otherwise effect the **City's** right to assert any claims it may have against the **Contractor** in a plenary action.

64.6 Where the **Work** covered by the **Contract** has been substantially completed, as determined in writing by the **Commissioner**, termination of the **Work** shall be handled as an omission of **Work** pursuant to Articles 29 and 33, in which case a change order will be issued to reflect an appropriate reduction in the **Contract** sum, or if the amount is determined after final payment, such amount shall be paid by the **Contractor**.

ARTICLE 65. CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE

65.1 This **Contract** shall be deemed to be executed in the **City** regardless of the domicile of the **Contractor**, and shall be governed by and construed in accordance with the **Laws** of the State of New York and the **Laws** of the United States, where applicable.

65.2 The parties agree that any and all claims asserted against the **City** arising under this **Contract** or related thereto shall be heard and determined in the courts of the State of New York ("New York State Courts") located in the **City** and County of New York. To effect this **Contract** and intent, the **Contractor** agrees:

65.2.1 If the **City** initiates any action against the **Contractor** in Federal court or in a New York State Court, service of process may be made on the **Contractor** either in person, wherever such **Contractor** may be found, or by registered mail addressed to the **Contractor** at its address as set forth in this **Contract**, or to such other address as the **Contractor** may provide to the **City** in writing; and

65.2.2 With respect to any action between the **City** and the **Contractor** in a New York State Court, the **Contractor** hereby expressly waives and relinquishes any rights it might otherwise have:

65.2.2(a) To move to dismiss on grounds of forum non conveniens;

65.2.2(b) To remove to Federal Court; and

65.2.2(c) To move for a change of venue to a New York State Court outside New York County.

65.2.3 With respect to any action brought by the **City** against the **Contractor** in a Federal Court located in the **City**, the **Contractor** expressly waives and relinquishes any right it might otherwise have to move to transfer the action to a Federal Court outside the **City**.

65.2.4 If the **Contractor** commences any action against the **City** in a court located other than in the **City** and County of New York, upon request of the **City**, the **Contractor** shall either consent to a transfer of the action to a New York State Court of competent jurisdiction located in the **City** and County of New York or, if the Court where the action is initially brought will not or cannot transfer the action, the **Contractor** shall consent to dismiss such action without prejudice and may thereafter reinstate the action in a New York State Court of competent jurisdiction in New York County.

65.3 If any provision(s) of this Article 65 is held unenforceable for any reason, each and all other provision(s) shall nevertheless remain in full force and effect.

ARTICLE 66. PARTICIPATION IN AN INTERNATIONAL BOYCOTT

66.1 The **Contractor** agrees that neither the **Contractor** nor any substantially owned affiliated company is participating or shall participate in an international boycott in violation of the provisions ofthe Federal Export Administration Act of 1979, as amended, or the regulations of the United States Department of Commerce (Commerce Department) promulgated thereunder.

66.2 Upon the final determination by the Commerce Department or any other agency of the United States as to, or conviction of the **Contractor** or a substantially-owned affiliated company thereof for participation in an international boycott in violation of the provisions of the Export Administration Act of 1979, as amended, or the regulations promulgated thereunder, the **Comptroller** may, at his/her option, render forfeit and void this **Contract**.

66.3 The **Contractor** shall comply in all respects, with the provisions of Section 6-114 of the Administrative Code and the rules and regulations issued by the **Comptroller** thereunder.

ARTICLE 67. LOCALLY BASED ENTERPRISE PROGRAM

67.1 This **Contract** is subject to the requirements of Section 6-108.1 of the Administrative Code and regulations promulgated thereunder. No construction contract shall be awarded unless and until these requirements have been complied with in their entirety; however, compliance with this Article 67 is not required if the Agency sets Subcontractor Participation Goals for Minority- and Women-Owned Business Enterprises (M/WBEs).

67.2 Unless specifically waived by the **Commissioner** with the approval of the Division of Economic and Financial Opportunity of the **City** Department of Business Services, if any portion of the **Contract** is subcontracted, not less than ten (10%) percent of the total dollar amount of the **Contract** shall be awarded to locally based enterprises (LBEs); except that where less than ten (10%) percent of the total dollar amount of the **Contract** is subcontracted, such lesser percentage shall be so awarded.

67.3 The **Contractor** shall not require performance and payment bonds from LBE **Subcontractors**.

67.4 If the **Contractor** has indicated prior to award that no **Work** will be subcontracted, no **Work** shall be subcontracted without the prior approval of the **Commissioner**, which shall be granted only if the **Contractor** makes a good faith effort beginning at least six (6) weeks before the **Work** is to be performed to obtain LBE **Subcontractors** to perform the **Work**.

67.5 If the **Contractor** has not identified sufficient LBE **Subcontractors** prior to award, it shall sign a letter of compliance stating that it complies with Section 6-108.1 of the Administrative Code, recognizes that achieving the LBE requirement is a condition of its **Contract**, and shall submit documentation demonstrating its good faith efforts to obtain LBEs. After award, the **Contractor** shall begin to solicit LBE's to perform subcontracted **Work** at least six (6) weeks before the date such **Work** is to be performed and shall demonstrate that a good faith effort has been made to obtain LBEs on each subcontract until it meets the required percentage.

67.6 Failure of the **Contractor** to comply with the requirements of Section 6-108.1 of the Administrative Code and the regulations promulgated thereunder shall constitute a material breach of this **Contract**. Remedy for such breach may include the imposition of any or all of the following sanctions:

67.6.1 Reducing the **Contractor's** compensation by an amount equal to the dollar value of the percentage of the LBE subcontracting requirement not complied with;

67.6.2 Declaring the **Contractor** in default;

67.6.3 If the **Contractor** is an LBE, de-certifying and declaring the **Contractor** ineligible to participate in the LBE program for a period of up to three (3) years.

ARTICLE 68. ANTITRUST

68.1 The **Contractor** hereby assigns, sells, and transfers to the **City** all right, title, and interest in and to any claims and causes of action arising under the antitrust **Laws** of New York State or of the United States relating to the particular goods or services purchased or procured by the **City** under this **Contract**.

ARTICLE 69. MacBRIDE PRINCIPLES PROVISIONS

69.1 Notice To All Prospective **Contractors**:

69.1.1 Local Law No. 34 of 1991 became effective on September 10, 1991 and added Section 6-115.1 of the Administrative Code. The local **Law** provides for certain restrictions on **City Contracts** to express the opposition of the people of the **City** to employment discrimination practices in Northern Ireland to promote freedom of work-place opportunity.

69.1.2 Pursuant to Section 6-115.1, prospective **Contractors** for **Contracts** to provide goods or services involving an expenditure of an amount greater than ten thousand ($10,000.) dollars, or for construction involving an amount greater than fifteen thousand ($15,000.) dollars, are asked to sign a rider in which they covenant and represent, as a material condition of their **Contract**, that any business operations in Northern Ireland conducted by the **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** will be conducted in accordance with the MacBride Principles of nondiscrimination in employment.

69.1.3 Prospective **Contractors** are not required to agree to these conditions. However, in the case of **Contracts** let by competitive sealed bidding, whenever the lowest responsible bidder has not agreed to stipulate to the conditions set forth in this notice and another bidder who has agreed to stipulate to such conditions has submitted a bid within five (5%) percent of the lowest responsible bid for a **Contract** to supply goods, services or contraction of comparable quality, the **Agency** shall refer such bids to the Mayor, the Speaker or other officials, as appropriate, who may determine, in accordance with applicable **Law**, that it is in the best interest of the **City** that the **Contract** be awarded to other than the lowest responsible pursuant to Section 313(b)(2) of the **City** Charter.

69.1.4 In the case of **Contracts** let by other than competitive sealed bidding, if a prospective **Contractor** does not agree to these conditions, no **Agency**, elected official or the **City** Council shall award the **Contract** to that bidder unless the **Agency** seeking to use the goods, services or construction certifies in writing that the **Contract** is necessary for the **Agency** to perform its functions and there is no other responsible **Contractor** who will supply goods, services or construction of comparable quality at a comparable price.

69.2 In accordance with Section 6-115.1 of the Administrative Code, the **Contractor** stipulates that such **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** either:

69.2.1 Have no business operations in Northern Ireland, or

69.2.2 Shall take lawful steps in good faith to conduct any business operations they have in

Northern Ireland in accordance with the MacBride Principles, and shall permit independent monitoring of their compliance with such principles.

69.3 For purposes of this Article, the following terms shall have the following meanings:

69.3.1 "MacBride Principles" shall mean those principles relating to nondiscrimination in employment and freedom of work-place opportunity which require employers doing business in Northern Ireland to:

69.3.1(a) increase the representation of individuals from under-represented religious groups in the workforce, including managerial, supervisory, administrative, clerical and technical jobs;

69.3.1(b) take steps to promote adequate security for the protection of employees from under-represented religious groups both at the work-place and while traveling toand from **Work**;

69.3.1(c) ban provocative religious or political emblems from the workplace;

69.3.1(d) publicly advertise all job openings and make special recruitment efforts to attract applicants from under-represented religious groups;

69.3.1(e) establish layoff, recall, and termination procedures which do not in practice favor a particular religious group;

69.3.1(f) abolish all job reservations, apprenticeship restrictions and different employment criteria which discriminate on the basis of religion;

69.3.1(g) develop training programs that will prepare substantial numbers of current employees from under-represented religious groups for skilled jobs, including the expansion of existing programs and the creation of new programs to train, upgrade, and improve the skills of workers from under-represented religious groups;

69.3.1(h) establish procedures to asses, identify, and actively recruit employees from under-represented religious groups with potential for further advancement; and

69.3.1(i) appoint a senior management staff member to oversee affirmative actionefforts and develop a timetable to ensure their full implementation.

69.4 The **Contractor** agrees that the covenants and representations in Article 69.2 are material conditions to this **Contract**. In the event the **Agency** receives information that the **Contractor** who made the stipulation required by this Article 69 is in violation thereof, the **Agency** shall review such information and give the **Contractor** an opportunity to respond. If the **Agency** finds that a violation has occurred, the **Agency** shall have the right to declare the **Contractor** in default in default and/or terminate this **Contract** for cause and procure supplies, services or **Work** from another source in the manner the **Agency** deems proper. In the event of such termination, the **Contractor** shall pay to the **Agency**, or the **Agency** in its sole discretion may withhold from any amounts otherwise payable to the **Contractor**, the difference between the **Contract** price for the uncompleted portion of this **Contract** and the cost to the **Agency** of completing performance of this **Contract** either itself or by engaging another **Contractor** or **Contractors**. In the case of a requirement **Contract**, the **Contractor** shall be liable for such difference in price for the entire amount of supplies required by the **Agency** for the uncompleted term of **Contractor's Contract**. In the case of a construction **Contract**, the **Agency** shall also have the right to hold the **Contractor** in partial or total default in

accordance with the default provisions of this **Contract**, and/or may seek debarment or suspension of the **Contractor**. The rights and remedies of the **Agency** hereunder shall be in addition to, and not in lieu of, any rights and remedies the **Agency** has pursuant to this **Contract** or by operation of **Law**.

ARTICLE 70. ELECTRONIC FILING/NYC DEVELOPMENT HUB

70.1 The **Contractor** shall electronically file all alteration type-2 and alteration type-3 applications via the New York City Development Hub Web site, except applications for the following types of minor alterations: enlargements, curb cuts, legalizations, fire alarms, builders pavement plans, and jobs filed on Landmark Preservation Commission calendared properties. All such filings must be professionally certified. Information about electronic filing via the New York City Development Hub is available on the **City** Department of Buildings Web site at www.nyc.gov/buildings.

ARTICLE 71. PROHIBITION OF TROPICAL HARDWOODS

71.1 Tropical hardwoods, as defined in Section 165 of the New York State Finance Law (Finance Law), shall not be utilized in the performance of this **Contract** except as expressly permitted by Section 165 of the Finance Law.

ARTICLE 72. CONFLICTS OF INTEREST

72.1 Section 2604 of the **City** Charter and other related provisions of the **City** Charter, the Administrative Code, and the Penal Law are applicable under the terms of this **Contract** in relation to conflicts of interest and shall be extended to **Subcontractors** authorized to perform **Work**, labor and services pursuant to this **Contract** and further, it shall be the duty and responsibility of the **Contractor** to so inform its respective **Subcontractors**. Notice is hereby given that, under certain circumstances, penalties may be invoked against the donor as well as the recipient of any form of valuable gift.

ARTICLE 73. MERGER CLAUSE

73.1 The written **Contract** herein, contains all the terms and conditions agreed upon by the parties hereto, and no other agreement, oral or otherwise, regarding the subject matter of this **Contract** shall be deemed to exist or to bind any of the parties hereto, or to vary any of the terms contained herein.

ARTICLE 74. STATEMENT OF WORK

74.1 The **Contractor** shall furnish all labor and materials and perform all **Work** in strictaccordance with the **Specifications** and **Addenda** thereto, numbered as shown in Schedule A.

ARTICLE 75. COMPENSATION TO BE PAID TO CONTRACTOR

75.1 The **City** will pay and the **Contractor** will accept in full consideration for the performance of the **Contract**, subject to additions and deductions as provided herein, the total sum shown in Schedule A, this said sum being the amount at which the **Contract** was awarded to the **Contractor** at a public letting thereof, based upon the **Contractor's** bid for the **Contract**.

ARTICLE 76. ELECTRONIC FUNDS TRANSFER

76.1 In accordance with Section 6-107.1 of the Administrative Code, the **Contractor** agrees to accept payments under this **Contract** from the **City** by electronic funds transfer (EFT). An EFT is any transfer of funds, other than a transaction originated by check, draft or similar paper instrument, which is initiated through an electronic terminal, telephonic instrument or computer or magnetic tape so as to order, instruct or authorize a financial institution to debit or credit an account. Prior to the first payment made under this **Contract**, the **Contractor** shall designate one financial institution or other authorized payment agent and shall complete the attached "EFT Vendor Payment Enrollment Form" in order to provide the Commissioner of the **City** Department of Finance with information necessary for the **Contractor** to receive electronic funds transfer payments through a designated financial institution or authorized payment agent. The crediting of the amount of a payment to the appropriate account on the books of a financial institution or other authorized payment agent designated by the **Contractor** shall constitute full satisfaction by the **City** for the amount of the payment under this **Contract**. The account information supplied by the **Contractor** to facilitate the electronic funds transfer shall remain confidential to the fullest extent provided by **Law**.

76.2 The **Commissioner** may waive the application of the requirements of this Article 76 to payments on contracts entered into pursuant to Section 315 of the **City** Charter. In addition, the Commissioner of the Department of Finance and the Comptroller may jointly issue standards pursuant to which the **Agency** may waive the requirements of this Article 76 for payments in the following circumstances: (i) for individuals or classes of individuals for whom compliance imposes a hardship; (ii) for classifications or types of checks; or (iii) in other circumstances as may be necessary in the interest of the **City**.

ARTICLE 77. RECORDS RETENTION

77.1 The **Contractor** agrees to retain all books, records, and other documents relevant to this **Contract** for six years after the final payment or termination of this **Contract**, whichever is later. **City**, state, and federal auditors and any other persons duly authorized by the **City** shall have full access to and the right to examine any such books, records, and other documents during the retention period.

ARTICLE 78. EXAMINATION AND VIEWING OF SITE, CONSIDERATION OF OTHER SOURCES OF INFORMATION AND CHANGED SITE CONDITIONS

78.1 Pre-Bidding (Investigation) Viewing of Site – Bidders must carefully view and examine the **Site** of the proposed **Work**, as well as its adjacent area, and seek other usual sources of information, for they will be conclusively presumed to have full knowledge of any and all conditions and hazards on, about or above the **Site** relating to or affecting in any way the performance of the **Work** to be done under the **Contract** that were or should have been known by a reasonably prudent bidder. To arrange a date for visiting the **Site**,

bidders are to contact the **Agency** contact person specified in the bid documents.

78.2 Should the **Contractor** encounter during the progress of the Work site conditions or environmental hazards at the **Site** materially differing from any shown on the **Contract Drawings** or indicated in the **Specifications** or such conditions or environmental hazards as could not reasonablyhave been anticipated by the **Contractor**, which conditions or hazards will materially affect the cost of the **Work** to be done under the **Contract**, the attention of the **Commissioner** must be called immediately to such conditions or hazards before they are disturbed. The **Commissioner** shall thereupon promptly investigate the conditions or hazards. If the **Commissioner** finds that they do so materially differ, and that they could not have been reasonably anticipated by the **Contractor**, the **Contract** may be modified with the **Commissioner**'s written approval.

ARTICLE 79. PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED BUSINESS ENTERPRISES IN CITY PROCUREMENT

ARTICLE I. M/WBE PROGRAM

Section 6-129 of the Administrative Code of the City of New York ("Section 6-129") establishes the program for participation in City procurement ("M/WBE Program") by minority- owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs"), certified in accordance with Section 1304 of the New York City Charter. As stated in Section 6- 129, the intent of the program is to address the impact of discrimination on the City's procurement process, and to promote the public interest in avoiding fraud and favoritism in the procurement process, increasing competition for City business, and lowering contract costs. The contract provisions contained herein are pursuant to Section 6-129, and the rules of the Department of Small Business Services ("DSBS") promulgated thereunder.

If this Contract is subject to the M/WBE Program established by Section 6-129, the specific requirements of MBE and/or WBE participation for this Contract are set forth in Schedule B of the Contract (entitled the "M/WBE Utilization Plan") and are detailed below.

The Contractor must comply with all applicable MBE and WBE requirements for this Contract.

All provisions of Section 6-129 are hereby incorporated in the Contract by reference and all terms used herein that are not defined herein shall have the meanings given such terms in Section 6-129.

References to MBEs or WBEs shall also include such businesses certified pursuant to the executive law where credit is required by section 311 of the New York City Charter or other provision of law.

Article I, Part A, below, sets forth provisions related to the participation goals for construction, standard and professional services contracts.

Article I, Part B, below, sets forth miscellaneous provisions related to the M/WBE Program.

PART A: PARTICIPATION GOALS FOR CONSTRUCTION, STANDARD AND PROFESSIONAL SERVICES CONTRACTS OR TASK ORDERS

1. The MBE and/or WBE Participation Goals established for this Contract or Task Orders issued pursuant to this Contract, ("Participation Goals"), as applicable, are set forth on Schedule B, Part 1 to this Contract (see Page 1, Line 1 Total Participation Goals) or will be set forth on Schedule B, Part 1 to Task Orders issued pursuant to this Contract, as applicable.

The Participation Goals represent a percentage of the total dollar value of the Contract or Task Order, as applicable, that may be achieved by awarding subcontracts to firms certified with DSBS as MBEs and/or WBEs, and/or by crediting the participation of prime contractors and/or qualified joint ventures as provided in Section 3 below, unless the goals have been waived or modified by Agency in accordance with Section 6-129 and Part A, Sections 10 and 11 below, respectively.

2. If Participation Goals have been established for this Contract or Task Orders issued pursuant to this Contract, Contractor agrees or shall agree as a material term of the Contract that Contractor shall be subject to the Participation Goals, unless the goals are waived or modified by Agency in accordance with Section 6-129 and Part A, Sections 10 and 11 below, respectively.

3. If Participation Goals have been established for this Contract or Task Order issued pursuant to this Contract, a Contractor that is an MBE and/or WBE shall be permitted to count its own participation toward fulfillment of the relevant Participation Goal, provided that in accordance with Section 6-129 the value of Contractor's participation shall be determined by subtracting from the total value of the Contract or Task Order, as applicable, any amounts that the Contractor pays to direct subcontractors (as defined in Section 6-129(c)(13)), and provided further that a Contractor that is certified as both an MBE and a WBE may count its own participation either toward the goal for MBEs or the goal for WBEs, but not both.

A Contractor that is a qualified joint venture (as defined in Section 6-129(c)(30)) shall be permitted to count a percentage of its own participation toward fulfillment of the relevant Participation Goal. In accordance with Section 6-129, the value of Contractor's participation shall be determined by subtracting from the total value of the Contract or Task Order, as applicable, any amounts that Contractor pays to direct subcontractors, and then multiplying the remainder by the percentage to be applied to total profit to determine the amount to which an MBE or WBE is entitled pursuant to the joint venture agreement, provided that where a participant in a joint venture is certified as both an MBE and a WBE, such amount shall be counted either toward the goal for MBEs or the goal for WBEs, but not both.

4. A. If Participation Goals have been established for this Contract, a prospective contractor shall be required to submit with its bid or proposal, as applicable, a completed Schedule B, M/WBE Utilization Plan, Part 2 (see Pages1-2) indicating: (a) whether the contractor is an MBE or WBE, or qualified joint venture; (b) the percentage of work it intends to award to direct subcontractors; (c) in cases where the contractor intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end; as well as the name, addresses, and telephone numbers of the M/WBE subcontractors if required by the solicitation; and (d) the prospective contractor's required certification and affirmations. In the event that this M/WBE Utilization Plan indicates that the bidder or proposer, as applicable, does not intend to meet the Participation Goals, the bid or proposal, as applicable, shall be deemed non-responsive, unless Agency has granted the bidder or proposer, as applicable, a pre-award waiver of the Participation Goals in accordance with Section 6-129 and Part A, Section 10 below.

B. (i) If this Contract is for a master services agreement or other requirements type contract that will result in the issuance of Task Orders that will be individually registered ("Master Services Agreement") and is subject to M/WBE Participation Goals, a prospective contractor shall be required to submit with its bid or proposal, as applicable, a completed Schedule B, M/WBE Participation Requirements for Master Services Agreements That Will Require Individually Registered Task Orders, Part 2 (page 2) indicating the prospective contractor's certification and required affirmations to make all reasonable good faith efforts to meet participation goals established on each individual Task Order issued pursuant to this Contract, or if a partial waiver is obtained or such goals are modified by the Agency, to meet the modified Participation Goals by soliciting and obtaining the participation of certified MBE and/or WBE firms. In the event that the Schedule B indicates that the bidder or proposer, as applicable, does not intend to meet the Participation Goals that may be established on Task Orders issued pursuant to this Contract, the bid or proposal, as applicable, shall be deemed non- responsive.

(ii) Participation Goals on a Master Services Agreement will be established for individual Task Orders issued after the Master Services Agreement is awarded. If Participation Goals have been established on a Task Order, a contractor shall be required to submit a Schedule B – M/WBE Utilization Plan For Independently Registered Task Orders That Are Issued Pursuant to Master Services Agreements, Part 2 (see Pages 1-2) indicating: (a) whether the contractor is an MBE or WBE, or qualified joint venture; (b) the percentage of work it intends to award to direct subcontractors; (c) in cases where the contractor intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end; as well as the name, addresses, and telephone numbers of the M/WBE subcontractors if required by the solicitation; and (d) the prospective contractor's required certification and affirmations. The contractor must engage in good faith efforts to meet the Participation Goals as established for the Task Order unless Agency has granted the contractor a pre-award waiver of the Participation Goals in accordance with Section 6-129 and Part A, Section 10 below.

C. THE BIDDER/PROPOSER MUST COMPLETE THE SCHEDULE B INCLUDED HEREIN (SCHEDULE B, PART 2). A SCHEDULE B SUBMITTED BY THE BIDDER/PROPOSER WHICH DOES NOT INCLUDE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS WILL BE DEEMED TO BE NON-RESPONSIVE, UNLESS A FULL WAIVER OF THE PARTICIPATION GOALS IS GRANTED (SCHEDULE B, PART 3). IN THE EVENT THAT THE CITY DETERMINES THAT THE BIDDER/PROPOSER HAS SUBMITTED A SCHEDULE B WHERE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS ARE COMPLETED BUT OTHER ASPECTS OF THE SCHEDULE B ARE NOT COMPLETE, OR CONTAIN A COPY OR COMPUTATION ERROR THAT IS AT ODDS WITH THE VENDOR CERTIFICATION AND AFFIRMATIONS, THE BIDDER/PROPOSER WILL BE NOTIFIED BY THE AGENCY AND WILL BE GIVEN FOUR (4) CALENDAR DAYS FROM RECEIPT OF NOTIFICATION TO CURE THE SPECIFIED DEFICIENCIES AND RETURN A COMPLETED SCHEDULE B TO THE AGENCY. FAILURE TO DO SO WILL RESULT IN A DETERMINATION THAT THE BID/PROPOSAL IS NON-RESPONSIVE. RECEIPT OF NOTIFICATION IS DEFINED AS THE DATE NOTICE IS E-MAILED OR FAXED (IF THE BIDDER/PROPOSER HAS PROVIDED AN E-MAIL ADDRESS OR FAX NUMBER), OR NO LATER THAN FIVE (5) CALENDAR DAYS FROM THE DATE OF MAILING OR UPON DELIVERY, IF DELIVERED.

5. Where an M/WBE Utilization Plan has been submitted, the Contractor shall, within 30 days of issuance by Agency of a notice to proceed, submit a list of proposed persons or entities to which it intends to award subcontracts within the subsequent 12 months. In the case of multi- year contracts, such list shall also be submitted every year thereafter. The Agency may also require the Contractor to report periodically about the contracts awarded by its direct subcontractors to indirect subcontractors (as defined in Section 6-129(c)(22)). PLEASE NOTE: If this Contract is a public works project subject to GML §101(5) (i.e., a contract valued at or below $3M for projects in New York City) or if the Contract is subject to a project labor agreement in accordance with Labor Law §222, and the bidder is required to identify at the time of bid submission its intended subcontractors for the Wicks trades (plumbing and gas fitting; steam heating, hot water heating, ventilating and air conditioning (HVAC); and electric wiring), the Contractor must identify all those to which it intends to award construction subcontracts for any portion of the Wicks trade work at the time of bid submission, regardless of what point in the life of the contract such subcontracts will occur. In identifying intended subcontractors in the bid submission, bidders may satisfy any Participation Goals established for this Contract by proposing one or more subcontractors that are MBEs and/or WBEs for any portion of the Wicks trade work. In the event that the Contractor's selection of a subcontractor is disapproved, the Contractor shall have a reasonable time to propose alternate subcontractors.

6. MBE and WBE firms must be certified by DSBS in order for the Contractor to credit such firms' participation toward the attainment of the Participation Goals. Such certification must occur prior to the firms' commencement of work. A list of city-certified MBE and WBE firms may be obtained from the DSBS website at www.nyc.gov/buycertified, by emailing DSBS at buyer@sbs.nyc.gov, by calling (212) 513-6451, or by visiting or writing DSBS at One Liberty Plaza ., New York, New York, 10006, 11th floor. Eligible firms that have not yet

been certified may contact DSBS in order to seek certification by visiting www.nyc.gov/getcertified, emailing MWBE@sbs.nyc.gov, or calling the DSBS certification helpline at (212) 513-6311. A firm that is certified as both an MBE and a WBE may be counted either toward the goal for MBEs or the goal for WBEs, but not both. No credit shall be given for participation by a graduate MBE or graduate WBE, as defined in Section 6-129(c)(20).

7. Where an M/WBE Utilization Plan has been submitted, the Contractor shall, with each voucher for payment, and/or periodically as Agency may require, submit statements, certified under penalty of perjury, which shall include, but not be limited to,: the total amount the Contractor paid to its direct subcontractors, and, where applicable pursuant to Section 6-129(j), the total amount direct subcontractors paid to indirect subcontractors; the names, addresses and contact numbers of each MBE or WBE hired as a subcontractor by the Contractor, and, where applicable, hired by any of the Contractor's direct subcontractors; and the dates and amounts paid to each MBE or WBE. The Contractor shall also submit, along with its voucher for final payment: the total amount it paid to subcontractors, and, where applicable pursuant to Section 6- 129(j), the total amount its direct subcontractors paid directly to their indirect subcontractors; and a final list, certified under penalty of perjury, which shall include the name, address and contact information of each subcontractor that is an MBE or WBE, the work performed by, and the dates and amounts paid to each.

8. If payments made to, or work performed by, MBEs or WBEs are less than the amount specified in the Contractor's M/WBE Utilization Plan, Agency shall take appropriate action, in accordance with Section 6-129 and Article II below, unless the Contractor has obtained a modification of its M/WBE Utilization Plan in accordance with Section 6-129 and Part A, Section 11 below.

9. Where an M/WBE Utilization Plan has been submitted, and the Contractor requests a change order the value of which exceeds the greater of 10 percent of the Contract or Task Order, as applicable, or $500,000, Agency shall review the scope of work for the Contract or Task Order, as applicable, and the scale and types of work involved in the change order, and determine whether the Participation Goals should be modified.

10. Pre-award waiver of the Participation Goals. (a) A bidder or proposer, or contractor with respect to a Task Order, may seek a pre-award full or partial waiver of the Participation Goals in accordance with Section 6-129, which requests that Agency change one or more Participation Goals on the grounds that the Participation Goals are unreasonable in light of the availability of certified firms to perform the services required, or by demonstrating that it has legitimate business reasons for proposing a lower level of subcontracting in its M/WBE Utilization Plan.

(b) To apply for a full or partial waiver of the Participation Goals, a bidder, proposer, or contractor, as applicable, must complete Part 3 of Schedule B **and submit such request no later than seven (7) calendar days prior to the date and time the bids, proposals, or Task Orders are due, in writing by email at MWBEModification@ddc.nyc.gov. Full or partial waiver requests that are received later than seven (7) calendar days prior to the date and time the bids, proposals, or Task Orders are due may be rejected as untimely.** Bidders, proposers, or contractors, as applicable, who have submitted timely requests will receive an Agency response by no later than two (2) calendar days prior to the due date for bids, proposals, or Task Orders; provided, however, that if that date would fall on a weekend or holiday, an Agency response will be provided by close-of-business on the business day before such weekend or holiday date.

(c) If the Agency determines that the Participation Goals are unreasonable in light of the availability of certified firms to perform the services required, it shall revise the solicitation and extend the deadline for bids and proposals, or revise the Task Order, as applicable.

(d) Agency may grant a full or partial waiver of the Participation Goals to a bidder, proposer or contractor, as applicable, who demonstrates—before submission of the bid, proposal or Task Order, as applicable—that it has legitimate business reasons for proposing the level of subcontracting in its M/WBE Utilization Plan. In making its determination, Agency shall consider factors that shall include, but not be limited

to, whether the bidder, proposer or contractor, as applicable, has the capacity and the bona fide intention to perform the Contract without any subcontracting, or to perform the Contract without awarding the amount of subcontracts represented by the Participation Goals. In making such determination, Agency may consider whether the M/WBE Utilization Plan is consistent with past subcontracting practices of the bidder, proposer or contractor, as applicable, whether the bidder, proposer or contractor, as applicable, has made efforts to form a joint venture with a certified firm, and whether the bidder, proposer, or contractor, as applicable, has made good faith efforts to identify other portions of the Contract that it intends to subcontract.

11. Modification of M/WBE Utilization Plan. (a) A Contractor may request a modification of its M/WBE Utilization Plan after award of this Contract. PLEASE NOTE: If this Contract is a public works project subject to GML §101(5) (i.e., a contract valued at or below $3M for projects in New York City) or if the Contract is subject to a project labor agreement in accordance with Labor Law §222, and the bidder is required to identify at the time of bid submission its intended subcontractors for the Wicks trades (plumbing and gas fitting; steam heating, hot water heating, ventilating and air conditioning (HVAC); and electric wiring), the Contractor may request a Modification of its M/WBE Utilization Plan as part of its bid submission. The Agency may grant a request for Modification of a Contractor's M/WBE Utilization Plan if it determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts to meet the Participation Goals. In making such determination, Agency shall consider evidence of the following efforts, as applicable, along with any other relevant factors:

(i) The Contractor advertised opportunities to participate in the Contract, where appropriate, in general circulation media, trade and professional association publications and small business media, and publications of minority and women's business organizations;
(ii) The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;
(iii) The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs or WBEs that their interest in the Contract was solicited;
(iv) The Contractor made efforts to identify portions of the work that could be substituted for portions originally designated for participation by MBEs and/or WBEs in the M/WBE Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;
(v) The Contractor held meetings with MBEs and/or WBEs prior to the date their bids or proposals were due, for the purpose of explaining in detail the scope and requirements of the work for which their bids or proposals were solicited;
(vi) The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts, or act as suppliers or service providers;
(vii) Timely written requests for assistance made by the Contractor to Agency's M/WBE liaison officer and to DSBS;
(viii) Description of how recommendations made by DSBS and Agency were acted upon and an explanation of why action upon such recommendations did not lead to the desired level of participation of MBEs and/or WBEs.

Agency's M/WBE officer shall provide written notice to the Contractor of the determination.

(b) The Agency may modify the Participation Goals when the scope of the work has been changed by the Agency in a manner that affects the scale and types of work that the Contractor indicated in its M/WBE Utilization Plan would be awarded to subcontractors.

12. If the Contractor was required to identify in its bid or proposal the MBEs and/or WBEs they intended to use in connection with the performance of the Contract or Task Order, substitutions to the identified firms may only be made with the approval of the Agency, which shall only be given when the Contractor has proposed to use a firm that would satisfy the Participation Goals to the same extent as the firm previously identified, unless the Agency determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts. In making such determination, the Agency shall require evidence of the

efforts listed in Section 11(a) above, as applicable, along with any other relevant factors.

13. If this Contract is for an indefinite quantity of construction, standard or professional services or is a requirements type contract and the Contractor has submitted an M/WBE Utilization Plan and has committed to subcontract work to MBEs and/or WBEs in order to meet the Participation Goals, the Contractor will not be deemed in violation of the M/WBE Program requirements for this Contract with regard to any work which was intended to be subcontracted to an MBE and/or WBE to the extent that the Agency has determined that such work is not needed.

14. If Participation Goals have been established for this Contract or a Task Order issued pursuant to this Contract, at least once annually during the term of the Contract or Task Order, as applicable, Agency shall review the Contractor's progress toward attainment of its M/WBE Utilization Plan, including but not limited to, by reviewing the percentage of work the Contractor has actually awarded to MBE and/or WBE subcontractors and the payments the Contractor made to such subcontractors.

15. If Participation Goals have been established for this Contract or a Task Order issued pursuant to this Contract, Agency shall evaluate and assess the Contractor's performance in meeting those goals, and such evaluation and assessment shall become part of the Contractor's overall contract performance evaluation.

PART B: MISCELLANEOUS

The Contractor shall take notice that, if this solicitation requires the establishment of a M/WBE Utilization Plan, the resulting contract may be audited by DSBS to determine compliance with Section 6-129. See §6-129(e)(10). Furthermore, such resulting contract may also be examined by the City's Comptroller to assess compliance with the M/WBE Utilization Plan.

1. Pursuant to DSBS rules, construction contracts that include a requirement for a M/WBE Utilization Plan shall not be subject to the law governing Locally Based Enterprises set forth in Section 6-108.1 of the Administrative Code of the City of New York.

2. DSBS is available to assist contractors and potential contractors in determining the availability of MBEs and/or WBEs to participate as subcontractors, and in identifying opportunities that are appropriate for participation by MBEs and/or WBEs in contracts.

3. Prospective contractors are encouraged to enter into qualified joint venture agreements with MBEs and/or WBEs as defined by Section 6-129(c)(30).

4. By submitting a bid or proposal the Contractor hereby acknowledges its understanding of the M/WBE Program requirements set forth herein and the pertinent provisions of Section 6-129, and any rules promulgated thereunder, and if awarded this Contract, the Contractor hereby agrees to comply with the M/WBE Program requirements of this Contract and pertinent provisions of Section 6-129, and any rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract. The Contractor hereby agrees to make all reasonable, good faith efforts to solicit and obtain the participation of MBEs and/or WBEs to meet the required Participation Goals.

ARTICLE II. ENFORCEMENT

1. If Agency determines that a bidder or proposer, as applicable, has, in relation to this procurement, violated Section 6-129 or the DSBS rules promulgated pursuant to Section 6-129, Agency may disqualify such bidder or proposer, as applicable, from competing for this Contract and the Agency may revoke such bidder's or proposer's prequalification status, if applicable.

2. Whenever Agency believes that the Contractor or a subcontractor is not in compliance with Section 6-129

or the DSBS rules promulgated pursuant to Section 6-129, or any provision of this Contract that implements Section 6-129, including, but not limited to any M/WBE Utilization Plan, Agency shall send a written notice to the Contractor describing the alleged noncompliance and offering the Contractor an opportunity to be heard. Agency shall then conduct an investigation to determine whether such Contractor or subcontractor is in compliance.

3. In the event that the Contractor has been found to have violated Section 6-129, the DSBS rules promulgated pursuant to Section 6-129, or any provision of this Contract that implements Section 6-129, including, but not limited to, any M/WBE Utilization Plan, Agency may determine that one of the following actions should be taken:

(a) entering into an agreement with the Contractor allowing the Contractor to cure the violation;
(b) revoking the Contractor's pre-qualification to bid or make proposals for future contracts;
(c) making a finding that the Contractor is in default of the Contract;
(d) terminating the Contract;
(e) declaring the Contractor to be in breach of Contract;
(f) withholding payment or reimbursement;
(g) determining not to renew the Contract;
(h) assessing actual and consequential damages;
(i) assessing liquidated damages or reducing fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the M/WBE Program, or in meeting the purposes of the Contract, the costs of meeting utilization goals through additional procurements, the administrative costs of investigation and enforcement, or other factors set forth in the Contract;
(j) exercising rights under the Contract to procure goods, services or construction from another contractor and charge the cost of such contract to the Contractor that has been found to be in noncompliance; or
(k) taking any other appropriate remedy.

4. If an M/WBE Utilization Plan has been submitted, and pursuant to this Article II, Section 3, the Contractor has been found to have failed to fulfill its Participation Goals contained in its M/WBE Utilization Plan or the Participation Goals as modified by Agency pursuant to Article I, Part A, Section 11, Agency may assess liquidated damages in the amount of ten percent (10%) of the difference between the dollar amount of work required to be awarded to MBE and/or WBE firms to meet the Participation Goals and the dollar amount the Contractor actually awarded and paid, and/or credited, to MBE and/or WBE firms. In view of the difficulty of accurately ascertaining the loss which the City will suffer by reason of Contractor’s failure to meet the Participation Goals, the foregoing amount is hereby fixed and agreed as the liquidated damages that the City will suffer by reason of such failure, and not as a penalty. Agency may deduct and retain out of any monies which may become due under this Contract the amount of any such liquidated damages; and in case the amount which may become due under this Contract shall be less than the amount of liquidated damages suffered by the City, the Contractor shall be liable to pay the difference.

5. Whenever Agency has reason to believe that an MBE and/or WBE is not qualified for certification, or is participating in a contract in a manner that does not serve a commercially useful function (as defined in Section 6-129(c)(8)), or has violated any provision of Section 6- 129, Agency shall notify the Commissioner of DSBS who shall determine whether the certification of such business enterprise should be revoked.

6. Statements made in any instrument submitted to Agency pursuant to Section 6-129 shall be submitted under penalty of perjury and any false or misleading statement or omission shall be grounds for the application of any applicable criminal and/or civil penalties for perjury. The making of a false or fraudulent statement by an MBE and/or WBE in any instrument submitted pursuant to Section 6-129 shall, in addition, be grounds for revocation of its certification.

7. The Contractor's record in implementing its M/WBE Utilization Plan shall be a factor in the evaluation of

its performance. Whenever Agency determines that a Contractor's compliance with an M/WBE Utilization Plan has been unsatisfactory, Agency shall, after consultation with the City Chief Procurement Officer, file an advice of caution form for inclusion in PASSPort as caution data.

Docusign Envelope ID: 69EC8D5D-3575-4C5A-BA08-683A40B223C3

CONTRACT SIGNATURE PAGE

This Contract is entered by and between the City of New York ("City"), acting by and through the **DEPARTMENT OF DESIGN AND CONSTRUCTION**, and **STALCO CONSTRUCTION INC** ("Contractor").

This Contract consists of this contract signature page as well as the following documents ("Contract Documents") which are located in the Documents tab of the PASSPort record titled **85025B0014-LQQ122-RG**.

1. LQQ122-RG Brokers Certification - Apr 11 2025 3:38PM
2. LQQ122-RG Disability Insurance - Apr 11 2025 3:39PM
3. LQQ122-RG Insurance Certificates - Apr 11 2025 3:37PM
4. LQQ122-RG PLA Letter of Assent - Stalco Constr - Apr 8 2025 7:23PM
5. LQQ122-RG Workers Compensation - Apr 11 2025 3:35PM
6. LQQ122-RG_Addendum_1 - Oct 16 2024 3:44PM
7. LQQ122-RG_Addendum_2 - Oct 16 2024 3:44PM
8. LQQ122-RG_Addendum3 - Oct 16 2024 4:49PM
9. LQQ122-RG_Addendum4 - Oct 28 2024 1:31PM
10. LQQ122-RG_Addendum5 - Nov 15 2024 4:45PM
11. LQQ122-RG_Addendum6 - Nov 22 2024 4:20PM
12. LQQ122-RG_Addendum7 - Dec 9 2024 4:38PM
13. LQQ122-RG_Addendum8 - Dec 30 2024 1:29PM
14. LQQ122-RG_Appendix_Addendum7 - Dec 6 2024 5:56PM
15. LQQ122-RG_Bid Drawings_Addendum7 - Volume 2 of 2 - Dec 6 2024 6:02PM
16. LQQ122-RG_Bid Drawings_Addendum8 - Volume 1 of 2 - Dec 20 2024 4:50PM
17. LQQ122-RG_Proprietary Items List_Addendum8 - Dec 20 2024 4:48PM
18. LQQ122-RG_Stalco Constr_Detailed Bid Breakdown - Apr 8 2025 7:22PM
19. LQQ122-RG_Volume2_Addendum6 - Nov 22 2024 3:15PM
20. LQQ122-RG_Volume3_Addendum_8 - Dec 30 2024 1:34PM
21. Proposal_Bid_85025B0014001 (1).pdf - Apr 10 2025 12:32PM
22. Proposal_Bid_85025B0014001 (2).pdf - Apr 8 2025 4:42PM
23. Proposal_Bid_85025B0014001 (5).pdf - Apr 10 2025 4:54PM
24. RFx Document_85025B0014001.pdf - Apr 8 2025 4:42PM
25. Security-Bond - Apr 11 2025 3:31PM
26. Subcontractor List(1) - Jan 13 2025 6:45PM

Docusign Envelope ID: 69EC8D5D-3575-4C5A-BA08-683A40B223C3

The above order does not represent an order of precedence. The Contract shall be governed by the order of precedence, if any, in the Contract Documents or by ordinary contract principles if no such order of precedence exists.

Each party is signing this Contract electronically on the date stated in that party's electronic signature.

The City of New York
By: **DEPARTMENT OF DESIGN AND CONSTRUCTION**

DocuSigned by:
ERIC MACFARLANE
1A87ABA0188B41C...
(Signature)

Name: ERIC MACFARLANE

Title: First Deputy Commissioner

Date: 4/21/2025 | 09:33:06 PDT

Contractor
By: **STALCO CONSTRUCTION INC**

DocuSigned by:
Alan Nahmias
C66DA36861464A7...
(Signature)

Name: Alan Nahmias

Title: President

Date: 4/21/2025 | 08:08:05 PDT

Docusign Envelope ID: 69EC8D5D-3575-4C5A-BA08-683A40B223C3

Signatures

Number of pages (including this one): 3

- ✓ Document signed electronically, the signatories agreeing that it is authentic between them.
- ✓ By signing this document, the signatories acknowledge and agree that they have carefully read this document and approve all its terms.

Nom: Nahmias Alan
Fonction: Principle/CFO

Place: Stalco Construction Inc.
Date: 4/21/2025 | 08:08:05 PDT
DocuSigned by:
Alan Nahmias
C66DA36861464A7...

Nom: Macfarlane Eric
Fonction:

Place: lic ny
Date: 4/21/2025 | 09:33:06 PDT
DocuSigned by:
ERIC MACFARLANE
1A87ABA0188B41C...

PERFORMANCE BOND #1

Performance Bond #1 (4 Pages): Use if the total contract price is $5 Million Or Less. Performance Bond #1 has been approved by the U.S. Small Business Administration ("SBA")for participation in its Bond Guarantee Program.

PERFORMANCE BOND #1 (Page 1)

KNOW ALL PERSONS BY THESE PRESENTS:,
That we, _____

_____

_____

hereinafter referred to as the "Principal,"
and, _____

_____

_____

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns in the penal sum of _____

_____

_____

($_____) Dollars, lawful money of the United States for the payment of whichsaid sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for

_____

_____

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth infull;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of the Principal's default of the Contract, and shall fully reimburse and repay the City for all outlay and expense which the City may incur in making good any such default and shall protect the said City of New York against, and pay any and all amounts, damages, cost and judgments which may or shall be recovered against said City or its officers or agents or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be nulland void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the Citythat the City has determined that the Principal is in default of the Contract, to (1) pay the City the cost tocomplete the contract as determined by the City in excess of the balance of the Contract held by the City, plus any damages or costs to which the City is entitled, up to the full amount of the above penal sum, (2)fully perform and complete the Work to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof, or (3) tender a completion Contractor that is acceptable to the City. The Surety (Sureties) further agrees, at its option, either to notify the City that it elects to pay the city thecost of completion plus any applicable damages and costs under option (1) above, or to commence anddiligently perform the Work specified in the Contract, including physical site work, within twenty-five
(25) business days after written notice thereof from the City and, if the Surety elects to fully perform and complete the Work, then to complete all Work within the time set forth in the Contract or such other timeas agreed to between the City and Surety in accordance with the Contract. If the Surety elects to tender payment pursuant to (1) above, then the Surety shall tender such amount within fifteen (15) business days notification from the City of the cost of completion. The Surety and the City reserve all rights and defenses each may have against the other; provided, however, that the Surety expressly agrees that its reservation of rights shall not provide a basis for non-performance of its obligation to pay the City the costof completion, to commence and complete all Work as provided herein, or to tender a completion contractor.

The Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected byany extension of time, modification, omission, addition, or change in or to the said Contract or the Workto be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions,changes, payments, and waivers, and hereby expressly stipulates and agrees that any and all things doneand omitted to be done by and in relation to subcontractors shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal. Notwithstanding the above, if the City makes payments to the Principal before the time required by the contract that in the aggregate exceed $100,000 or 10% of the Contract price, whichever is less, and that have not become earned prior to the Principal being found to be in default, then all payments made to the Principal before the time required by the Contract shall be added to the remaining contract value available to be paid forthe completion of the Contract as if such sums had not been paid to the Principal, but shall not provide abasis for non-performance of its obligation to pay the City the cost of completion, to commence and to complete all Work as provided herein, or to tender a completion contractor.

IN WITNESS WHEREOF, The Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this

_____ day of _____, 20_____.(Seal)

_____(L.S.)
Principal

(Seal)

By: _____.

Surety

By: _____.
_____.
(Seal) Surety

By: _____.
_____.
(Seal) Surety

By: _____.
_____.
(Seal) Surety

By: _____.
_____.
(Seal) Surety

By: _____.

Bond Premium Rate _____.

Bond Premium Cost _____.

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by aduly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the numberof counterparts of the Contract.

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of_____ County of_____ ss:

On this_____ day of_____, 20_____ before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she resides at _____
_____; that he/she is the _____
of the corporation described in and which executed the foregoing instrument; and that he/she signed his/her name to the foregoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF A PARTNERSHIP

State of_____ County of_____ ss:

On this_____ day of_____, 20_____ before me personally came_____,
to me known, who, being by me duly sworn did dispose and say that he/she resides at _____
_____; that he/she is_____ partner of
_____, a limited/general partnership existing under the laws of the State of
_____, the partnership described in and which executed the foregoing instrument; and that he/she signed his/her name to the foregoing instrument as the duly authorized and binding act of said partnership.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF AN INDIVIDUAL

State of_____ County of_____ ss:

On this_____ day of_____, 20_____ before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she resides at _____
_____, and that he/she is the individual whose name is subscribed to the within instrument and acknowledged to me that by his/her signature on the instrument, said individual executed the instrument.

_____
Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by: (a) appropriate acknowledgments of the respective parties; (b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bond is executed by agent, officer or other representative of Principal or Surety; (c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued, and (d) certified copy of latest published financial statement of assets and liabilities of Surety.

* * * * * * * *

Affix Acknowledgments and Justification of Sureties.

PERFORMANCE BOND #2

Performance Bond #2 (4 pages): Use if the total contract price is more than $5 Million.

PERFORMANCE BOND #2 (Page 1)

PERFORMANCE BOND #2KNOW ALL PERSONS BY THESE PRESENTS:,

That we, Stalco Construction, Inc.

hereinafter referred to as the "Principal,"
and, Endurance Assurance Corporation

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns in the penal sum of Thirty Three Million Eight Hundred Seventy Thousand and 00/00 Dollars

($ 33,870,000.00) Dollars, lawful money of the United States for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for LQQ122-RG: Rego Park Library: New Facility - Borough of Queens

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth infull;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the Cityfrom all cost and damage which it may suffer by reason of the Principal's default of the Contract, and shall fully reimburse and repay the City for all outlay and expense which the City may incur in making

good any such default and shall protect the said City of New York against, and pay any and all amounts,damages, cost and judgments which may or shall be recovered against said City or its officers or agents orwhich the said City of New York may be called upon to pay any person or corporation by reason of anydamages arising or growing out of the Principal's default of the Contract, then this obligation shall be nulland void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the Citythat the City has determined that the Principal is in default of the Contract, to either (1) pay the full amount of the above penal sum in complete discharge and exoneration of this bond and of all the liabilities of the Surety relating to this bond, or (2) fully perform and complete the Work to be performed under theContract, pursuant to the terms, conditions, and covenants thereof. The Surety (Sureties) further agrees, at its option, either to tender the penal sum or to commence and diligently perform the Work specified in theContract, including physical site work, within twenty-five (25) business days after written notice thereoffrom the City and to complete all Work within the time set forth in the Contract or such other time as agreed to between the City and Surety in accordance with the Contract. The Surety and the City reserveall rights and defenses each may have against the other; provided, however, that the Surety expressly agrees that its reservation of rights shall not provide a basis for non-performance of its obligation to commence and to complete all Work as provided herein.

The Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected byany extension of time, modification, omission, addition, or change in or to the said Contract or the Workto be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any Work to be performed or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any andall things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal.

IN WITNESS WHEREOF, The Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this

9th day of April 2025.

(Seal)

Stalco Construction, Inc. (L.S.)
Principal

(Seal)

By: _____

Surety
Endurance Assurance Corporation

By: Katherine Acosta
Katherine Acosta, Attorney-in-Fact
(Seal) Surety

By: _____
_____
(Seal) Surety

By: _____
_____
(Seal) Surety

By: _____
_____
(Seal) Surety

By: _____

Bond Premium Rate $14.40 sliding scale

Bond Premium Cost $221,782.00

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by aduly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the numberof counterparts of the Contract.

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of New York County of Suffolk ss:

On this 9th day of April, ~~2025~~, 20 25 before me personally came Alan Nannies,
to me known, who, being by me duly sworn did depose and say that he residesat
Ft Salonga, New York ; that he/she is the President
of the corporation described in and which executed the foregoing instrument; that he/she signed his/her name to theforegoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

Notary Public or Commissioner of Deeds.

KRYSTIE RUOTOLO
NOTARY PUBLIC, STATE OF NEW
Registration No. 01RU6381903
Qualified in Suffolk County
Commission Expires Oct. 15, 2026

ACKNOWLEDGMENT OF PRINCIPAL IF A PARTNERSHIP

State of_____County of_____ss:

On this_____day of_____, 20_____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she residesat_____
_____; that he/she is_____partner of _____, a limited/general partnership existing under the laws of the State of _____, the partnership described in and which executed the foregoing instrument;and that he/she signed his/her name to the foregoing instrument as the duly authorized and binding act of said partnership.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL IF AN INDIVIDUAL

State of_____County of_____ss:

On this_____day of_____, 20_____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she residesat_____
_____, and that he/she is the individual whose name is subscribed to the within instrument and acknowledged to me that by his/her signature on the instrument, said individual executed the instrument.

_____
Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by: (a) appropriate acknowledgments of the respective parties; (b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bond is executed by agent, officer or other representative of Principal or Surety; (c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued, and (d) certified copy of latest published financial statement of assets and liabilities of Surety.

* * * * * * * *

Affix Acknowledgments and Justification of Sureties.

KRYSTLE RUOTOLO
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01RU6351901
Qualified in Suffolk County
Commission Expires Dec. 15, 2

ACKNOWLEDGEMENT OF SURETY COMPANY

STATE OF NEW YORK

COUNTY OF NASSAU

On this April 9, 2025, before me personally came Katherine Acosta to me known, who, being by me duly sworn, did depose and say; that he/she resides in Suffolk County, State of New York that he/she is the Attorney-In-Fact of the Endurance Assurance Corporation the corporation described in which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that is was so affixed by the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order; and the affiant did further depose and say that the Superintendent of Insurance of the State of New York, has, pursuant to Section 1111 of the Insurance Law of the State of New York, issued to Endurance Assurance Corporation (Surety) his/her certificate of qualification evidencing the qualification of said Company and its sufficiency under any law of the State of New York as surety and guarantor, and the propriety of accepting and approving it as such; and that such Certificate has not been revoked.

TARA LAVERDIERE
Notary Public, State of New York
Registration #01LA6076587
Qualified in Nassau County
Commission Expires June 24, 2026

Notary Public

SOMPO INTERNATIONAL
INSURANCE

POWER OF ATTORNEY

2697

KNOW ALL BY THESE PRESENTS, that **Endurance Assurance Corporation, a Delaware corporation ('EAC'), Endurance American Insurance Company, a Delaware corporation ('EAIC'), Lexon Insurance Company, a Texas corporation ('LIC'), and/or Bond Safeguard Insurance Company, a South Dakota corporation ('BSIC'), each,** a "Company" and collectively, **"Sompo International**," do hereby constitute and appoint: **Vincent A. Walsh, Louis J. Spina, Thomas Bean, Camille Maitland, Colette R. Chisholm, Dana Granice, Desiree Cardlin, George O. Brewster, Gerard S. Macholz, Karolynne Ramirez, Katherine Acosta, Lee Ferrucci, Michelle Wannamaker, Nelly Renchiwich, Peter F. Jones, Robert T. Pearson, Susan Lupski**
as true and lawful Attorney(s)-In-Fact to make, execute, seal, and deliver for, and on its behalf as surety or co-surety; bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking so made, executed and delivered shall obligate the Company for any portion of the penal sum thereof in excess of the sum of **One Hundred Million ($100,000,000.00)**

Such bonds and undertakings for said purposes, when duly executed by said attorney(s)-in-fact, shall be binding upon the Company as fully and to the same extent as if signed by the President of the Company under its corporate seal attested by its Corporate Secretary.

This appointment is made under and by authority of certain resolutions adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC, a copy of which appears below under the heading entitled "Certificate".

This Power of Attorney is signed and sealed by facsimile under and by authority of the following resolution adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolution has not since been revoked, amended or repealed:

RESOLVED, that the signature of an individual named above and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signature or seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

IN WITNESS WHEREOF, each Company has caused this instrument to be signed by the following officers, and its corporate seal to be affixed this 25th day of May, 2023.

Endurance Assurance Corporation
By:
Richard Appel; SVP & Senior Counsel

Endurance American Insurance Company
By:
Richard Appel; SVP & Senior Counsel

Lexon Insurance Company
By:
Richard Appel; SVP & Senior Counsel

Bond Safeguard Insurance Company
By:
Richard Appel; SVP & Senior Counsel

Endurance Assurance Corporation CORPORATE SEAL 2002 DELAWARE

Endurance American Insurance Company CORPORATE SEAL 1996 DELAWARE

LEXON INSURANCE COMPANY CORPORATE SEAL STATE OF TEXAS MARCH 16, 1984

BOND SAFEGUARD INSURANCE COMPANY A SOUTH DAKOTA INSURANCE COMPANY

ACKNOWLEDGEMENT

On this 25th day of May, 2023, before me, personally came the above signatories known to me, who being duly sworn, did depose and say that he/they is an officer of each of the Companies; and that he executed said instrument on behalf of each Company by authority of his office under the by-laws of each Company.

AMY TAYLOR STATE TENNESSEE NOTARY PUBLIC DAVIDSON COUNTY

By:
Amy Taylor, Notary Public – My Commission Expires 3/9/27

CERTIFICATE

I, the undersigned Officer of each Company, DO HEREBY CERTIFY that:

1. That the original power of attorney of which the foregoing is a copy was duly executed on behalf of each Company and has not since been revoked, amended or modified; that the undersigned has compared the foregoing copy thereof with the original power of attorney, and that the same is a true and correct copy of the original power of attorney and of the whole thereof;
2. The following are resolutions which were adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolutions have not since been revoked, amended or modified:
   "RESOLVED, that each of the individuals named below is authorized to make, execute, seal and deliver for and on behalf of the Company any and all bonds, undertakings or obligations in surety or co-surety with others: RICHARD M. APPEL, MATTHEW E. CURRAN, MARGARET HYLAND, SHARON L. SIMS, CHRISTOPHER L. SPARRO,
   and be it further
   RESOLVED, that each of the individuals named above is authorized to appoint attorneys-in-fact for the purpose of making, executing, sealing and delivering bonds,
   undertakings or obligations in surety or co-surety for and on behalf of the Company."
3. The undersigned further certifies that the above resolutions are true and correct copies of the resolutions as so recorded and of the whole thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the corporate seal this 9th day of April, 2025

By: Daniel S. Lupe, Secretary

NOTICE: U. S. TREASURY DEPARTMENT'S OFFICE OF FOREIGN ASSETS CONTROL (OFAC)

No coverage is provided by this Notice nor can it be construed to replace any provisions of any surety bond or other surety coverage provided. This Notice provides information concerning possible impact on your surety coverage due to directives issued by OFAC. **Please read this Notice carefully.**
The Office of Foreign Assets Control (OFAC) administers and enforces sanctions policy, based on Presidential declarations of "national emergency". OFAC has identified and listed numerous foreign agents, front organizations, terrorists, terrorist organizations, and narcotics traffickers as "Specially Designated Nationals and Blocked Persons". This list can be located on the United States Treasury's website – https://www.treasury.gov/resource-center/sanctions/SDN-List.
In accordance with OFAC regulations, if it is determined that you or any other person or entity claiming the benefits of any coverage has violated U.S. sanctions law or is a Specially Designated National and Blocked Person, as identified by OFAC, any coverage will be considered a blocked or frozen contract and all provisions of any coverage provided are immediately subject to OFAC. When a surety bond or other form of surety coverage is considered to be such a blocked or frozen contract, no payments nor premium refunds may be made without authorization from OFAC. Other limitations on the premiums and payments may also apply.

Any reproductions are void.

Surety Claims Submission: LexonClaimAdministration@sompo-intl.com
Telephone: 615-553-9500 Mailing Address: Sompo International; 12890 Lebanon Road; Mount Juliet, TN 37122-2870

ENDURANCE ASSURANCE CORPORATION
Balance Sheet - Statutory - Basis
December 31, 2024

Assets:		
Bonds	$	9,575,738,600
Preferred stocks		15,965,244
Common stocks		2,974,058,744
Cash, cash equivalents, and short-term investments		380,926,489
Other invested assets		382,161,094
Receivables for securities		7,743,789
Total cash and invested assets		**13,336,593,960**
Agents' balances or uncollected premiums		3,751,103,321
Reinsurance recoverable on loss and loss adjustment expense payments		1,079,426,776
Funds held by or deposited with reinsured companies		146,694,256
Investment income due and accrued		75,551,122
Current federal and foreign income tax recoverable and interest thereon		9,551,514
Net deferred tax asset		201,158,214
Receivables from parent, subsidiaries and affiliates		38,811,391
Other assets		396,387,073
Total admitted assets	$	**19,035,277,627**
Liabilities:		
Loss and loss adjustment expenses	$	7,434,113,469
Reinsurance payable on paid loss and loss adjustment expenses		797,536,780
Commissions payable, contingent commissions and other similar charges		7,067,852
Other expenses		26,564,195
Taxes, licenses and fees (excluding federal and foreign income taxes)		18,927,896
Unearned premiums		2,959,915,954
Advanced premium		9,091,368
Dividends declared and unpaid (stockholders)		430,000,000
Ceded reinsurance premiums payable		1,659,311,317
Funds held by company under reinsurance treaties		155,788,157
Amounts withheld or retained by company for account of others		702,732,322
Remittances and items not allocated		186,045,368
Provision for reinsurance		26,000,766
Payable to parent, subsidiaries and affiliates		234,928,735
Payable for securities		48,893,701
Other liabilities		57,059,433
Total liabilities		**14,753,977,313**
Capital and surplus:		
Common capital stock		5,000,000
Gross paid in and contributed surplus		3,480,137,280
Unassigned funds (surplus)		794,870,512
Aggregate write-ins for special surplus funds		1,292,522
Total capital and surplus		**4,281,300,314**
Total liabilities and capital and surplus	$	**19,035,277,627**

I, Hana Entela, Treasurer of Endurance Assurance Corporation (the "Company") do hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities, Capital and Surplus of the Company as of December 31, 2024 prepared in conformity with accounting practices prescribed or permitted by the State of Delaware Department of Insurance. The foregoing statement should not be taken as a complete statement of financial condition of the Company. Such a statement is available upon request at the Company's office located at 4 Manhattanville Road, Purchase, NY 10577.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Company at Purchase, New York.

Hana Entela

Subscribed and sworn to before me this 25th day of March, 2025
State of New York, County of Westchester
Fiona McNamara



EACX4045813

PAYMENT BOND

Use for any contract for which a Payment Bond is required.

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, That we, Stalco Construction, Inc.

hereinafter referred to as the "Principal", and Endurance Assurance Corporation

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns, in the penal sum of

Thirty Three Million Eight Hundred Seventy Thousand and 00/100 Dollars

($ 33,870,000.00) Dollars, lawful money of the United States, for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for

LQQ122-RG: Rego Park Library: New Facility - Borough of Queens

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns and other Subcontractors to whom Work under this Contract is sublet and his or their successors and assigns shall promptly pay or cause to be paid all lawful claims for

(a) Wages and compensation for labor performed and services rendered by all persons engaged in the prosecution of the Work under said Contract, and any amendment or extension thereof or addition thereto, whether such persons be agents servants or employees of the Principal or any such Subcontractor, including all persons so engaged who perform the work of laborers or mechanics at or in the vicinity of the site of the Project regardless of any contractual relationship between the Principal or such Subcontractors, or his or their successors or assigns, on the one hand and such laborers or mechanics on the other, but not including office employees not regularly stationed at the site of the project; and

(b) Materials and supplies (whether incorporated in the permanent structure or not), as well as teams, fuels, oils, implements or machinery furnished, used or consumed by said Principal or any subcontractor at or in the vicinity of the site of the Project in the prosecution of the Work under said Contract and any amendment or extension thereof or addition thereto; then this obligation shall be void, otherwise to remain infull force and effect.

This bond is subject to the following additional conditions, limitations and agreements:

(a) The Principal and Surety (Sureties) agree that this bond shall be for the benefit of any materialmen or laborer having a just claim, as well as the City itself.

(b) All persons who have performed labor, rendered services or furnished materials and supplies,as aforesaid, shall have a direct right of action against the Principal and his, its or their successors and assigns, and the Surety (Sureties) herein, or against either or both or any of them and their successors and assigns. Such persons may sue in their own name, and may prosecute the suit to judgment and execution without the necessity of joining with any other persons as party plaintiff.

(c) The Principal and Surety (Sureties) agree that neither of them will hold the City liable for any judgment for costs of otherwise, obtained by either or both of them against a laborer or materialman in a suit brought by either a laborer or materialman under this bond for moneys allegedly due for performing work or furnishing material.

(d) The Surety (Sureties) or its successors and assigns shall not be liable for any compensation recoverable by an employee or laborer under the Workmen's Compensation Law.

(e) In no event shall the Surety (Sureties), or its successors or assigns, be liable for a greater sum than the penalty of this bond or be subject to any suit, action or proceeding hereon that is instituted by any person, firm, or corporation hereunder later than two years after the complete performance of said Contract and final settlement thereof.

The Principal, for himself and his successors and assigns, and the Surety (Sureties), for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the rightof the City to require a bond containing the foregoing provisions, and they do hereby further expressly waiveany defense which they or either of them might interpose to an action brought hereon by any person, firm or corporation, including subcontractors, materialmen and third persons, for work, labor, services, supplies or material performed rendered, or furnished as aforesaid upon the ground that there is no law authorizing the City to require the foregoing provisions to be place in this bond.

And the Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties), and its bonds shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or of the said Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any part thereof, or of any Work to be performed, or any moneys due to become due thereunder and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, Subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done or in relation to said Principal.

IN WITNESS WHEREOF, the Principal and the Surety (Sureties) have hereunto set their handsand seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed andthese presents to be signed by their proper officers, this 9th day of April, 2025.

(Seal) Stalco Construction, Inc. (L.S.)Principal

By:

(Seal) Endurance Assurance Corporation Surety

By: Katherine Acosta

Katherine Acosta, Attorney-in-Fact

(Seal) _____ Surety

By: _____

(Seal) _____ Surety

By: _____

(Seal) _____ Surety

By: _____

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by aduly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the numberof counterparts of the Contract.

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of New York County of Suffolk ss:

On this 9th day of April, 2025, before me personally came Alan Nahmias to me known, who, being by me duly sworn did depose and say that he resides at Ft Salonga, New York that he is the President of the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he signed his name thereto by like order.

KRYSTIE RUOTOLO
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01RU6381903
Qualified in Suffolk County
Commission Expires Oct. 15, 20 26

Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

State of_____County of_____ss:

On this_____day of_____,_____, before me personally appeared _____ to me known, and known to me to be one of the members of the firm of _____ _____ described in and who executed the foregoing instrument; and he acknowledged to me that he executed the same as and for the act and deed of said firm.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

State of_____County of_____ss:

On this _____ day of_____,_____, before me personally appeared _____ to me known, and known to me to be the person described in and who executed the foregoing instrument; and acknowledged that he executed the same.

_____
Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by: (a) appropriate acknowledgments of the respective parties; (b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bondis executed by agent, officer or other representative of Principal or Surety; (c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued, and (d) certified copy of latest published financial statement of assets and liabilities of Surety.

* * * * * * * *

Affix Acknowledgments and Justification of Sureties.

ACKNOWLEDGEMENT OF SURETY COMPANY

STATE OF NEW YORK

COUNTY OF NASSAU

On this April 9, 2025, before me personally came Katherine Acosta to me known, who, being by me duly sworn, did depose and say; that he/she resides in Suffolk County, State of New York that he/she is the Attorney-In-Fact of the Endurance Assurance Corporation the corporation described in which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that is was so affixed by the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order; and the affiant did further depose and say that the Superintendent of Insurance of the State of New York, has, pursuant to Section 1111 of the Insurance Law of the State of New York, issued to Endurance Assurance Corporation (Surety) his/her certificate of qualification evidencing the qualification of said Company and its sufficiency under any law of the State of New York as surety and guarantor, and the propriety of accepting and approving it as such; and that such Certificate has not been revoked.

TARA LAVERDIERE
Notary Public, State of New York
Registration #01LA6076587
Qualified in Nassau County
Commission Expires June 24, 2026

Notary Public

SOMPO INTERNATIONAL
INSURANCE

POWER OF ATTORNEY

2697

KNOW ALL BY THESE PRESENTS, that **Endurance Assurance Corporation, a Delaware corporation ('EAC'), Endurance American Insurance Company, a Delaware corporation ('EAIC'), Lexon Insurance Company, a Texas corporation ('LIC'), and/or Bond Safeguard Insurance Company, a South Dakota corporation ('BSIC'), each,** a "Company" and collectively, **"Sompo International,"** do hereby constitute and appoint: **Vincent A. Walsh, Louis J. Spina, Thomas Bean, Camille Maitland, Colette R. Chisholm, Dana Granice, Desiree Cardlin, George O. Brewster, Gerard S. Macholz, Karolynne Ramirez, Katherine Acosta, Lee Ferrucci, Michelle Wannamaker, Nelly Renchiwich, Peter F. Jones, Robert T. Pearson, Susan Lupski**
as true and lawful Attorney(s)-In-Fact to make, execute, seal, and deliver for, and on its behalf as surety or co-surety; bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking so made, executed and delivered shall obligate the Company for any portion of the penal sum thereof in excess of the sum of **One Hundred Million ($100,000,000.00)**

Such bonds and undertakings for said purposes, when duly executed by said attorney(s)-in-fact, shall be binding upon the Company as fully and to the same extent as if signed by the President of the Company under its corporate seal attested by its Corporate Secretary.

This appointment is made under and by authority of certain resolutions adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC, a copy of which appears below under the heading entitled "Certificate".

This Power of Attorney is signed and sealed by facsimile under and by authority of the following resolution adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolution has not since been revoked, amended or repealed:

RESOLVED, that the signature of an individual named above and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signature or seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

IN WITNESS WHEREOF, each Company has caused this instrument to be signed by the following officers, and its corporate seal to be affixed this 25th day of May, 2023.

Endurance Assurance Corporation
By:
Richard Appel; SVP & Senior Counsel

Endurance American Insurance Company
By:
Richard Appel; SVP & Senior Counsel

Lexon Insurance Company
By:
Richard Appel; SVP & Senior Counsel

Bond Safeguard Insurance Company
By:
Richard Appel; SVP & Senior Counsel

Endurance Assurance Corporation CORPORATE SEAL 2002 DELAWARE

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ACKNOWLEDGEMENT

On this 25th day of May, 2023, before me, personally came the above signatories known to me, who being duly sworn, did depose and say that he/they is an officer of each of the Companies; and that he executed said instrument on behalf of each Company by authority of his office under the by-laws of each Company.

AMY TAYLOR STATE OF TENNESSEE NOTARY PUBLIC DAVIDSON COUNTY

By:
Amy Taylor, Notary Public – My Commission Expires 3/9/27

CERTIFICATE

I, the undersigned Officer of each Company, DO HEREBY CERTIFY that:

1. That the original power of attorney of which the foregoing is a copy was duly executed on behalf of each Company and has not since been revoked, amended or modified; that the undersigned has compared the foregoing copy thereof with the original power of attorney, and that the same is a true and correct copy of the original power of attorney and of the whole thereof;
2. The following are resolutions which were adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolutions have not since been revoked, amended or modified:
   "RESOLVED, that each of the individuals named below is authorized to make, execute, seal and deliver for and on behalf of the Company any and all bonds, undertakings or obligations in surety or co-surety with others: RICHARD M. APPEL, MATTHEW E. CURRAN, MARGARET HYLAND, SHARON L. SIMS, CHRISTOPHER L. SPARRO,
   and be it further
   RESOLVED, that each of the individuals named above is authorized to appoint attorneys-in-fact for the purpose of making, executing, sealing and delivering bonds,
   undertakings or obligations in surety or co-surety for and on behalf of the Company."
3. The undersigned further certifies that the above resolutions are true and correct copies of the resolutions as so recorded and of the whole thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the corporate seal this 9th day of April, 20 25

By: Daniel S. Lupe, Secretary

NOTICE: U. S. TREASURY DEPARTMENT'S OFFICE OF FOREIGN ASSETS CONTROL (OFAC)

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In accordance with OFAC regulations, if it is determined that you or any other person or entity claiming the benefits of any coverage has violated U.S. sanctions law or is a Specially Designated National and Blocked Person, as identified by OFAC, any coverage will be considered a blocked or frozen contract and all provisions of any coverage provided are immediately subject to OFAC. When a surety bond or other form of surety coverage is considered to be such a blocked or frozen contract, no payments nor premium refunds may be made without authorization from OFAC. Other limitations on the premiums and payments may also apply.

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Surety Claims Submission: LexonClaimAdministration@sompo-intl.com
Telephone: 615-553-9500 Mailing Address: Sompo International; 12890 Lebanon Road; Mount Juliet, TN 37122-2870

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Balance Sheet - Statutory - Basis
December 31, 2024

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Payable for securities		48,893,701
Other liabilities		57,059,433
Total liabilities		**14,753,977,313**
Capital and surplus:		
Common capital stock		5,000,000
Gross paid in and contributed surplus		3,480,137,280
Unassigned funds (surplus)		794,870,512
Aggregate write-ins for special surplus funds		1,292,522
Total capital and surplus		**4,281,300,314**
Total liabilities and capital and surplus	$	**19,035,277,627**

I, Hana Entela, Treasurer of Endurance Assurance Corporation (the "Company") do hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities, Capital and Surplus of the Company as of December 31, 2024 prepared in conformity with accounting practices prescribed or permitted by the State of Delaware Department of Insurance. The foregoing statement should not be taken as a complete statement of financial condition of the Company. Such a statement is available upon request at the Company's office located at 4 Manhattanville Road, Purchase, NY 10577.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Company at Purchase, New York.

Hana Entela

Subscribed and sworn to before me this 25th day of March, 2025
State of New York, County of Westchester
Fiona McNamara



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 04/08/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Tracy Anziano	
AssuredPartners Northeast, LLC. 100 Baylis Road Suite 300 Melville NY 11747	PHONE (A/C, No, Ext): (631) 465-4000	FAX (A/C, No):
	E-MAIL ADDRESS: tracy.anziano@assuredpartners.com	

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A :	Valley Forge Insurance Co.	20508
INSURER B :	Continental Casualty Company	20443
INSURER C :	Continental Insurance Co.	35289
INSURER D :	Nat'l Fire Ins.Co.of Hartford	20478
INSURER E :	Endurance American Insurance Co.	10641
INSURER F :		

INSURED

STALCO CONSTRUCTION INC.
1316 MOTOR PKWY
ISLANDIA NY 11749

COVERAGES **CERTIFICATE NUMBER:** *25-26* **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR [X] Contractual Liability [X] XCU Included GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC [ ] OTHER:	Y	Y	7015379257	02/01/2025	02/01/2026	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 2,000,000 $ 1,000,000 $ 15,000 $ 2,000,000 $ 4,000,000 $ 4,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY	Y	Y	7015379260	02/01/2025	02/01/2026	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
C	[X] UMBRELLA LIAB [X] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [X] RETENTION $ 10,000	Y	Y	7015379274	02/01/2025	02/01/2026	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N: N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	Y	7017815909	02/01/2025	02/01/2026	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
E	Excess Liability 4 x 5	Y	Y	EXN30078472000	02/01/2025	02/01/2026	Limit	4M xs 5M

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: Stalco Job #2513
Rego Park Library - New Facility
91-41 63rd Drive, Rego Park, NY 11374
The following are included as additional insured if required by written contract subject to the terms and conditions of the stated policies:
City of New York, including its officials and employees, The City of New York Department of Design and Construction, Weiss / Manfredi, Severud Associates, The Queens Borough Library and the Library Board of Trustees, Ronco Realty LLC, North Fork Holding LLC
General Liability, auto, and umbrella coverage apply on a primary and non-contributory basis, with a waiver of subrogation in favor of additional insured's

CERTIFICATE HOLDER

The City of New York Department of Design and Construction
30-30 Thomson Avenue
Long Island City NY 11101-3045

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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AGENCY CUSTOMER ID: 00194675

LOC #:

ADDITIONAL REMARKS SCHEDULE

Page ____ of ____

AGENCY	NAMED INSURED
AssuredPartners Northeast, LLC.	STALCO CONSTRUCTION INC.
POLICY NUMBER	
CARRIER / NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: 25 **FORM TITLE:** Certificate of Liability Insurance: Notes

Insurer (F) Westchester Surplus Lines Ins. NAIC #10172 Policy #G70969075 006 Practice Pollution Liability $2,000,000 Occurrence/ $2,000,000 Aggregate
10K Retention Effective 02/01/2025 to 02/01/2026
Insurer (G) Hartford Fire Insurance Company NAIC #19682 Policy #12UUMBJ2176 Blanket Leased Equipment $250,000 Effective 04/02/2024 to 04/02/2025
Insurer (H) Admiral Insurance Company NAIC #24856
Policy #DEP1639325P7 Employment Practices Liability limit $1,000,000 effective 02/01/2025 to 02/01/2026

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AGENCY CUSTOMER ID: 194675

NEW YORK CONSTRUCTION CERTIFICATE OF LIABILITY INSURANCE ADDENDUM

DATE (MM/DD/YYYY): 01/28/2025

THIS ADDENDUM SUMMARIZES SOME OF THE POLICY PROVISIONS IN THE REFERENCED INSURANCE POLICIES AND IS ISSUED AS A MATTER OF INFORMATION ONLY; IT CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. ALL TERMS, EXCLUSIONS AND CONDITIONS IN THE ACTUAL POLICY SHOULD BE CONSULTED FOR A MORE DETAILED ANALYSIS OF COVERAGE, AS THIS ADDENDUM DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES.

AGENCY		NAMED INSURED(S)	
AssuredPartners Northeast, LLC.		Stalco Construction Inc	
POLICY NUMBER	**EFFECTIVE DATE**	**CARRIER**	**NAIC CODE**
7015379257	02/01/2025	V alley Forge Insurance Co.	20508

ADDENDUM INFORMATION **CERTIFICATE NUMBER:** **REVISION NUMBER:**

A. Insurer

- [X] Admitted / authorized
- [ ] Excess line or free trade zone

B. General Liability (GL) policy form

- [X] ISO / ISO modified
- [ ] Other

C. Specific operations excluded or restricted (GL policy)

- [ ] Location:
- [X] Type of construction: Exterior Finish System Products/Completed Operations Exclusion Endorsement - New York
- [ ] Building height:
- [ ] Classifications [see attached declarations / endorsement]
- [ ] Designated work [see attached endorsement]

D. Additional insured endorsement (GL policy)

- [ ] CG 20 10 [ ] CG 20 26 [ ] CG 20 32 [ ] CG 20 33 [ ] CG 20 37 [ ] CG 20 38
- [X] Other: #: CNA75079XX Title: Blanket additional insured-Owners , Lessees or Contractors - with products completed operations

E. According to the terms of this GL policy, the additional insured has primary and noncontributory coverage

- [X] Yes [ ] No and [ ] no other option is available with this insurer

F. Additional insured will receive advance notice if insurer cancels (GL policy)

- [ ] Yes [X] No and [ ] no other option is available with this insurer

G. Blanket contractual liability located in the "insured contract" definition (Section V, Number 9, Item f. in the ISO CGL policy) is removed or restricted

- [ ] Yes and [ ] no other option is available with this insurer [X] No changes made

H. "Insured contract" exception to the employers liability exclusion is removed or modified (GL policy)

- [ ] Yes and [ ] no other option is available with this insurer [X] No changes made

I. GL policy (including endorsements) does not cover the additional insured for claims involving injury to employees of the named insured or subcontractors (not workers' compensation)

- [ ] Yes and [ ] no other option is available with this insurer [X] No changes made

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J. Earth movement, excavation or explosion / collapse / underground property damage is excluded or restricted (GL policy)

☐ Yes and ☐ no other option is available with this insurer ☒ No changes made

K. Insured vs. insured suits (cross liability in the ISO CGL policy) are excluded or restricted (other than named insured vs. named insured)

☐ Yes and ☐ no other option is available with this insurer ☒ No changes made

L. Property damage to work performed by subcontractors (exception to the "damage to your work" exclusion in the ISO CGL policy) is excluded or restricted

☐ Yes and ☐ no other option is available with this insurer ☒ No changes made

M. Excess / umbrella policy is primary and non-contributory for additional insureds

☐ Yes, by specific policy provision ☒ Yes, by endorsement ☐ No and ☐ no other option is available with this insurer

AUTHORIZED REPRESENTATIVE SIGNATURE

01/28/2025

DATE (MM/DD/YYYY)

CNA

CNA PARAMOUNT

Additional Insured - Owners, Lessees or Contractors - Scheduled Person or Organization Endorsement

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE
Name Of Additional Insured Person(s) Or Organization(s)
City of New York, including its officials and employees, The City of New York Department of Design and Construction, Weiss / Manfredi, Severud Associates, The Queens Borough Library and the Library Board of Trustees, Ronco Realty LLC, North Fork Holding LLC
Location(s) Of Covered Operations
Rego Park Library - New Facility 91-41 63rd Drive, Rego Park, NY 11374

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

It is understood and agreed as follows:

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10020005770153792578414

CNA

CNA PARAMOUNT

Additional Insured - Owners, Lessees or Contractors - Scheduled Person or Organization Endorsement

A. **Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for **bodily injury**, **property damage** or **personal and advertising injury** caused, in whole or in part, by:

1. Your acts or omissions; or

2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to **bodily injury** or **property damage** occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or

2. That portion of **your work** out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance**:

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

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CNA

CNA PARAMOUNT

Additional Insured - Owners, Lessees or Contractors - Completed Operations Endorsement

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE
Name Of Additional Insured Person(s) Or Organization(s)
City of New York, including its officials and employees, The City of New York Department of Design and Construction, Weiss / Manfredi, Severud Associates, The Queens Borough Library and the Library Board of Trustees, Ronco Realty LLC, North Fork Holding LLC
Location And Description Of Completed Operations
Rego Park Library - New Facility 91-41 63rd Drive, Rego Park, NY 11374

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

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10020005770153792578460

CNA

CNA PARAMOUNT

Additional Insured - Owners, Lessees or Contractors - Completed Operations Endorsement

It is understood and agreed as follows:

A. **Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for **bodily injury** or **property damage** caused, in whole or in part, by **your work** at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the **products-completed operations hazard**.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance**:

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

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CONTRACTORS EXTENDED COVERAGE ENDORSEMENT - BUSINESS AUTO PLUS

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

I. LIABILITY COVERAGE

A. Who Is An Insured

The following is added to **Section II, Paragraph A.1., Who Is An Insured**:

1. **a.** Any incorporated entity of which the Named Insured owns a majority of the voting stock on the date of inception of this Coverage Form; provided that,

   b. The insurance afforded by this provision **A.1.** does not apply to any such entity that is an **insured** under any other liability "policy" providing **auto** coverage.

2. Any organization you newly acquire or form, other than a limited liability company, partnership or joint venture, and over which you maintain majority ownership interest.

   The insurance afforded by this provision **A.2.**:

   a. Is effective on the acquisition or formation date, and is afforded only until the end of the policy period of this Coverage Form, or the next anniversary of its inception date, whichever is earlier.

   b. Does not apply to:

   (1) **Bodily injury** or **property damage** caused by an **accident** that occurred before you acquired or formed the organization; or

   (2) Any such organization that is an **insured** under any other liability "policy" providing **auto** coverage.

3. Any person or organization that you are required by a written contract to name as an additional insured is an **insured** but only with respect to their legal liability for acts or omissions of a person, who qualifies as an **insured** under **SECTION II – WHO IS AN INSURED** and for whom Liability Coverage is afforded under this policy. If required by written contract, this insurance will be primary and non-contributory to insurance on which the additional insured is a Named Insured.

4. An **employee** of yours is an **insured** while operating an **auto** hired or rented under a contract or agreement in that **employee's** name, with your permission, while performing duties related to the conduct of your business.

"Policy", as used in this provision **A. Who Is An Insured,** includes those policies that were in force on the inception date of this Coverage Form but:

1. Which are no longer in force; or
2. Whose limits have been exhausted.

B. Bail Bonds and Loss of Earnings

Section II, Paragraphs A.2. (2) and A.2. (4) are revised as follows:

1. In **a.(2),** the limit for the cost of bail bonds is changed from $2,000 to $5,000; and
2. In **a.(4),** the limit for the loss of earnings is changed from $250 to $500 a day.

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C. Fellow Employee

Section II, Paragraph B.5 does not apply.

Such coverage as is afforded by this provision C. is excess over any other collectible insurance.

II. PHYSICAL DAMAGE COVERAGE

A. Glass Breakage – Hitting A Bird Or Animal – Falling Objects Or Missiles

The following is added to **Section III, Paragraph A.3.**:

With respect to any covered **auto**, any deductible shown in the Declarations will not apply to glass breakage if such glass is repaired, in a manner acceptable to us, rather than replaced.

B. Transportation Expenses

Section III, Paragraph A.4.a. is revised, with respect to transportation expense incurred by you, to provide:

a. $60 per day, in lieu of $20; subject to

b. $1,800 maximum, in lieu of $600.

C. Loss of Use Expenses

Section III, Paragraph A.4.b. is revised, with respect to loss of use expenses incurred by you, to provide:

a. $1,000 maximum, in lieu of $600.

D. Hired "Autos"

The following is added to **Section III. Paragraph A.**:

5. Hired "Autos"

If Physical Damage coverage is provided under this policy, and such coverage does not extend to Hired Autos, then Physical Damage coverage is extended to:

a. Any covered **auto** you lease, hire, rent or borrow without a driver; and

b. Any covered **auto** hired or rented by your **employee** without a driver, under a contract in that individual **employee's** name, with your permission, while performing duties related to the conduct of your business.

c. The most we will pay for any one **accident** or **loss** is the actual cash value, cost of repair, cost of replacement or $75,000, whichever is less, minus a $500 deductible for each covered auto. No deductible applies to **loss** caused by fire or lightning.

d. The physical damage coverage as is provided by this provision is equal to the physical damage coverage(s) provided on your owned **autos.**

e. Such physical damage coverage for hired **autos** will:

(1) Include loss of use, provided it is the consequence of an **accident** for which the Named Insured is legally liable, and as a result of which a monetary loss is sustained by the leasing or rental concern.

(2) Such coverage as is provided by this provision will be subject to a limit of $750 per **accident.**

E. Airbag Coverage

The following is added to **Section III, Paragraph B.3.**:

The accidental discharge of an airbag shall not be considered mechanical breakdown.

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F. Electronic Equipment

Section III, Paragraphs B.4.c and B.4.d. are deleted and replaced by the following:

c. Physical Damage Coverage on a covered **auto** also applies to **loss** to any permanently installed electronic equipment including its antennas and other accessories

d. A $100 per occurrence deductible applies to the coverage provided by this provision.

G. Diminution In Value

The following is added to **Section III, Paragraph B.6.**:

Subject to the following, the **diminution in value** exclusion does not apply to:

a. Any covered **auto** of the private passenger type you lease, hire, rent or borrow, without a driver for a period of 30 days or less, while performing duties related to the conduct of your business; and

b. Any covered **auto** of the private passenger type hired or rented by your **employee** without a driver for a period of 30 days or less, under a contract in that individual **employee's** name, with your permission, while performing duties related to the conduct of your business.

c. Such coverage as is provided by this provision is limited to a **diminution in value** loss arising directly out of accidental damage and not as a result of the failure to make repairs; faulty or incomplete maintenance or repairs; or the installation of substandard parts.

d. The most we will pay for **loss** to a covered **auto** in any one accident is the lesser of:

(1) $5,000; or

(2) 20% of the **auto's** actual cash value (ACV).

III. Drive Other Car Coverage – Executive Officers

The following is added to **Sections II and III**:

1. Any **auto** you don't own, hire or borrow is a covered **auto** for Liability Coverage while being used by, and for Physical Damage Coverage while in the care, custody or control of, any of your "executive officers", except:

a. An **auto** owned by that "executive officer" or a member of that person's household; or

b. An **auto** used by that "executive officer" while working in a business of selling, servicing, repairing or parking **autos**.

Such Liability and/or Physical Damage Coverage as is afforded by this provision.

(1) Equal to the greatest of those coverages afforded any covered **auto**; and

(2) Excess over any other collectible insurance.

2. For purposes of this provision, "executive officer" means a person holding any of the officer positions created by your charter, constitution, by-laws or any other similar governing document, and, while a resident of the same household, includes that person's spouse.

Such "executive officers" are **insureds** while using a covered **auto** described in this provision.

IV. BUSINESS AUTO CONDITIONS

A. Duties In The Event Of Accident, Claim, Suit Or Loss

The following is added to **Section IV, Paragraph A.2.a.**:

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(4) Your **employees** may know of an **accident** or **loss**. This will not mean that you have such knowledge, unless such **accident** or **loss** is known to you or if you are not an individual, to any of your executive officers or partners or your insurance manager.

The following is added to **Section IV, Paragraph A.2.b.**:

(6) Your **employees** may know of documents received concerning a claim or **suit**. This will not mean that you have such knowledge, unless receipt of such documents is known to you or if you are not an individual, to any of your executive officers or partners or your insurance manager.

B. Transfer Of Rights Of Recovery Against Others To Us

The following is added to **Section IV, Paragraph A.5. Transfer Of Rights Of Recovery Against Others To Us**:

We waive any right of recovery we may have, because of payments we make for injury or damage, against any person or organization for whom or which you are required by written contract or agreement to obtain this waiver from us.

This injury or damage must arise out of your activities under a contract with that person or organization.

You must agree to that requirement prior to an **accident** or **loss**.

C. Concealment, Misrepresentation or Fraud

The following is added to **Section IV, Paragraph B.2.**:

Your failure to disclose all hazards existing on the date of inception of this Coverage Form shall not prejudice you with respect to the coverage afforded provided such failure or omission is not intentional.

D. Other Insurance

The following is added to **Section IV, Paragraph B.5.**:

Regardless of the provisions of Paragraphs **5.a.** and **5.d.** above, the coverage provided by this policy shall be on a primary non-contributory basis. This provision is applicable only when required by a written contract.

That written contract must have been entered into prior to **Accident** or **Loss**.

E. Policy Period, Coverage Territory

Section IV, Paragraph B. 7.(5).(a). is revised to provide:

a. 45 days of coverage in lieu of 30 days.

V. DEFINITIONS

Section V. paragraph C. is deleted and replaced by the following:

Bodily injury means bodily injury, sickness or disease sustained by a person, including mental anguish, mental injury or death resulting from any of these.

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BUSINESS AUTO COVERAGE PART DECLARATIONS - NEW YORK

ITEM ONE

Named Insured and Mailing Address

Named Insured:
STALCO CONSTRUCTION INC

Mailing Address:
1316 MOTOR PKWY
ISLANDIA, NY 11749-5225

Form of Business

Corporation (Not Otherwise Classified)

Policy Information

Policy Number: 7015379260

Renewal of: BUA 7015379260

Insurer's Name and Address:
Continental Casualty Company
151 N Franklin St
Chicago, IL 60606

Producer Information

Producer: ASSUREDPARTNERS NORTHEAST, LLC

Producer Address:
100 BAYLIS RD STE 300
MELVILLE, NY 11747-3840

Producer Code: 730-089970

Policy Period

02/01/2025 to 02/01/2026 at 12:01 a.m. Standard Time at your mailing address shown above.

Your policy is composed of this Declarations, with the attached Common Policy Conditions, Coverage Forms, and Endorsements, if any. The Policy Forms and Endorsement Schedule shows all the forms applicable to this policy at the time of policy issuance.

Premium, Surcharges, Taxes and Fees at Issuance

Estimated Business Auto Policy Premium	
NY Motor Vehicle Law Enforcement Fee	
Total Policy Charges	

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Premium Payable and Audit, if applicable

Premium Payable At Inception:	
Audit Period	

In return for the payment of the premium, and subject to all the terms of this policy, we agree with you to provide the insurance as stated in this Coverage Part.

Forms and Endorsements Attached to this Policy

See **SCHEDULE OF FORMS AND ENDORSEMENTS**

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ITEM TWO

SCHEDULE OF COVERAGES AND COVERED AUTOS

This policy provides only those coverages where a charge is shown in the premium column below. Each of these coverages will apply only to those **"autos"** shown as covered **"autos". "Autos" are shown as covered "autos" for a particular coverage by the entry of one or more of the symbols from the Covered Autos section of the Business Auto Coverage Form next to the name of the coverage.**

** The maximum amount payable under SUM coverage shall be the policy's SUM limits, reduced and thus offset by motor vehicle bodily injury liability insurance policy or bond payments received from, or on behalf of, any negligent party involved in the accident, as specified in the SUM endorsement.

Coverages	Covered Auto Symbol	Limit Or Deductible	Premium
Covered Autos Liability - Combined Single Limit	1	$1,000,000	
New York Supplemental Spousal Liability		**Included in Bodily Injury Limits**	
Basic Personal Injury Protection	5	$50,000	
Optional Basic Economic Loss		No Coverage	
Added Personal Injury Protection	5	$100,000	
Aggregate No-fault Benefits Available	5	$150,000	
Maximum Monthly Work Loss	5	$2,000	
Other Necessary Expenses (per day)	5	$25	
Death Benefit		No Coverage	
Property Protection Insurance (Michigan Only)		**Separately Stated in the Property Protection Insurance Endorsement**	
Auto Medical Payments	2	See Schedule Each Insured	
Medical Expense And Income Loss Benefits (Virginia Only)		**Separately Stated in the Medical Expense And Income Loss Benefits Endorsement**	

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ITEM TWO

SCHEDULE OF COVERAGES AND COVERED AUTOS (CONTINUED)

Coverages	Covered Auto Symbol	Limit Or Deductible	Premium
Uninsured Motorists		**No Coverage**	
Supplementary Uninsured/Underinsured Motorists (SUM)	2	**$1,000,000**	
Underinsured Motorists (When Not Included in Uninsured Motorists Coverage)			
Physical Damage Comprehensive Coverage	7	See Item Three **Deductible** **For Each Covered Auto, For Loss Caused By Theft, Mischief Or Vandalism** **OR** **For All Perils For Each Covered Auto** (A maximum deductible may also apply. Refer to the Coverage Form for details.) See Item Four for Hired or Borrowed Autos.	
Physical Damage Specified Causes of Loss Coverage		See Item Three **Deductible** **For All Perils For Each Covered Auto** (A maximum deductible may also apply. Refer to the Coverage Form for details.) See Item Four for Hired or Borrowed Autos.	
Physical Damage Collision Coverage	7	See Item Three **Deductible** **For Each Covered Auto** See Item Four for Hired or Borrowed Autos.	
Physical Damage Towing and Labor	7	$50 **for Each Disablement of a Private Passenger Auto, Light Truck or Medium Truck**	

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SOMPO INTERNATIONAL

Endurance American Insurance Company

(Wilmington, Delaware)

Policy No. EXN30078472000
Renewal of: New

COMMERCIAL EXCESS LIABILITY DECLARATIONS PAGE

1. NAMED INSURED AND ADDRESS:
Stalco Construction Inc
Per Underlying Insurance
1316 Motor Pkwy
Islandia, NY 11749

2. POLICY PERIOD:
12:01 a.m. Standard Time at the address of the Insured shown at the left
From: 02/01/2025 **To:** 02/01/2026

IN RETURN FOR PAYMENT OF THE PREMIUM AND SUBJECT TO ALL TERMS OF THIS POLICY, WE AGREE WITH YOU TO PROVIDE THE INSURANCE AS STATED IN THIS POLICY.

PRODUCER'S NAME AND ADDRESS:
RSG Specialty, LLC dba RT Specialty
2 Jericho Plaza
Suite 302
Jericho, NY 11753

3. PREMIUM:

Total Advance Premium	
Service Charge	
Taxes	
Surcharge	
Total	

BASIS OF PREMIUM: Non-Auditable (X) Auditable ()

4. LIMITS OF INSURANCE:

$ 4,000,000	Each Occurrence Limit
$ 4,000,000	Aggregate Limit (Where Applicable)

These Limits of Insurance apply in excess of the "underlying limits of insurance" indicated in Item 5. of the Declarations.

5. UNDERLYING INSURANCE: See attached schedule

6. FORMS AND ENDORSEMENTS applicable to all Coverage Forms and made part of this policy at time of issue are listed on the attached Forms and Endorsements Schedule EXL 0101.

ISSUING OFFICE:
1221 Avenue of the Americas
New York, NY 10020

Authorized Representative

NOTICE: THESE POLICY FORMS AND THE APPLICABLE RATES ARE EXEMPT FROM THE FILING REQUIREMENTS OF THE NEW YORK INSURANCE LAW AND REGULATIONS. HOWEVER, THE FORMS AND RATES MUST MEET THE MINIMUM STANDARDS OF THE NEW YORK INSURANCE LAW AND REGULATIONS.

2-13000

FORMS AND ENDORSEMENT SCHEDULE

It is hereby understood and agreed the following forms and endorsements are attached to and are a part of this policy:

Form Number	Form Name
EXL 0001 0615	Commercial Excess Liability Declarations Page
EXL 1302A 0610	New York Claim Notice with Eclaim Notice
EXL 0102 0606	Schedule of Underlying Policies
EXL 6001 0813	Absolute Asbestos Exclusion
EXL 0573 0606	Cyber Liability Exclusion
EXL 0516 0610	Exclusion-Violation of Information Statutes
EXL 1037 0806	New York - War Liability Exclusion
EXL 0599 0720 NY	New York Communicable Disease Exclusion
EXL 6066 0817	Nuclear Energy Liability Exclusion
EXL 1323 0610	Sub-Limited Coverage Exclusion
EXL 0537 1206	Uninsured/Underinsured Motorist Exclusion
EXL 3044 0318	Bankruptcy or Insolvency Condition Endorsement
EXL 6123 0214	Coverage Unimpaired Aggregate
IL 1201 0115	Exclusion of Certified Acts of Terrorism and Exclusion of Other Acts
EXL 1035 0806	New York - Amendatory Endorsement
EXL 1007 0319	New York Changes - Transfer of Duties When A Limit of Insurance Is Used Up
EXL 0925 0719 NY	New York Changes-Cancellation and Nonrenewal
EXL 1213 0115	New York Changes
EXL 6086 0813	Residential Work Exclusion With Exception
IL 1313 1220	TRIA Rejection of Offer
EXL 0203 0813	Excess Liability Coverage Follow Form (Short Form)
IL 1007 1222	Signature Page
PN 0001 0721	U.S. Treasury Department's Office of Foreign Assets Control (OFAC)

SCHEDULE OF UNDERLYING POLICIES

Carrier, Policy Number and Period	Type of Coverage	Limits of Insurance
The Continental Insurance Company CUE7015379274 02/01/2025 - 02/01/2026	Umbrella	$ 5,000,000 Each Occurrence $ 5,000,000 General Aggregate $ 5,000,000 Products/Completed Operations Aggregate Excess of Primary

EXCESS LIABILITY COVERAGE FOLLOW FORM (SHORT FORM)

Read the entire policy carefully to determine rights, duties and what is and is not covered. Throughout this policy the words "you" and "your" refer to the Named Insured. The words "we", "us" and "our" refer to the Company providing this insurance. The word "insured" means any person or organization qualifying as such in the "first underlying insurance" which is the controlling policy listed in Item 5 of the Declarations, unless designated otherwise in the Declarations. Other words and phrases that appear in quotation marks have special meaning and can be found in the **DEFINITIONS** Section or the specific policy provision where they appear.

In consideration of the payment of the premium and in reliance upon the statements in the Declarations, we agree with you to provide coverage as follows:

INSURING AGREEMENTS

I. COVERAGE

We will pay on behalf of the insured the amount of "loss" covered by this insurance in excess of the "underlying limits of insurance" subject to the **LIMITS OF INSURANCE** Section. This policy will follow form to the terms, conditions, definitions, and exclusions of the "first underlying insurance" in effect the first day of the Policy Period, except to the extent that the terms, conditions, definitions, and exclusions of this policy differ from the "first underlying insurance." In no event shall this policy provide broader coverage than is provided by any policy in the "underlying insurance" shown in Item 5. of the Declarations, except if specifically provided otherwise by endorsement.

II. LIMITS OF INSURANCE

A. The Each Occurrence limit stated in Item 4. of the Declarations is the most we will pay for all "loss" arising out of any one occurrence to which this policy applies.

B. The aggregate limit shown in Item 4. of the Declarations is the most we will pay for all "loss" that is subject to an aggregate limit provided by the "first underlying insurance" and shall apply in the same manner as the aggregate limits provided by the "first underlying insurance".

C. This policy applies only in excess of the "underlying limits of insurance" and only after the "underlying limits of insurance" have been exhausted.

III. DEFENSE

We will follow the Defense provisions of the "first underlying insurance". In the event there are no Defense provisions contained in the "first underlying insurance", we will have the right, but not the duty to be associated with you or your underlying insurer or both in the investigation of any claim or defense of any suit which in our opinion may create liability to our policy for "loss." If we exercise such right, we will do so at our own expense, but we will have no such expense obligation or liability once the Limits of Insurance are exhausted.

IV. PREMIUM

If any additional premium charge is made to the "underlying insurance" during the Policy Period or if there is an increase in the risk assumed by us, our premium may be adjusted.

V. DEFINITIONS

A. "Loss" means those sums actually paid in the settlement or satisfaction of a claim which you are legally obligated to pay as damages, including but not limited to "bodily injury" and "property damage", after making proper deductions for all recoveries and salvage.

B. "Underlying limits of insurance" means the sum of the limits of all applicable "underlying insurance" listed in Item 5. of the Declarations, including self-insured retentions (SIRs), deductibles or other forms of insurance or self-insurance applicable to a given claim or occurrence.

VI. CONDITIONS

A. Changes

This policy can only be changed by a written endorsement signed by one of our authorized representatives that becomes a part of this policy.

B. First Named Insured Duties

The person or organization first named in Item 1. of the Declarations is responsible for the payment of all premiums. The first Named Insured will act on behalf of all other Named Insureds for the giving and receiving of notice of cancellation or the receipt of any return premium that become payable.

C. Maintenance of "Underlying Insurance"

During the period of this policy, you agree to keep all "underlying insurance" in full force and effect and that the "underlying limits of insurance" will be maintained, except to the extent such limits may be reduced or exhausted by payment for "loss" covered by "underlying insurance." If you fail to comply with these requirements, we will only be liable to the same extent that we would have been had you fully complied with these requirements.

D. Notice of Occurrence

You must see to it that we are notified as soon as practicable of an occurrence which may result in a claim or suit which may involve this policy. If a claim or suit against any insured is reasonably likely to involve this policy you must notify us in writing as soon as practicable.

If the "underlying limits of insurance" are exhausted solely by payment of "loss", no insured will, except at their own cost, voluntarily make a payment, assume any obligation, or incur any expense, other than for first aid, without our written consent.

E. Other Insurance

If other insurance applies to a "loss" that is also covered by this policy, this policy will apply excess of the other insurance. However, this provision will not apply if the other insurance is specifically written to be excess of this policy. Other insurance includes any type of self-insurance or other mechanism by which an insured arranges for funding of legal liabilities.

F. Conformity to Statute

Any terms of this policy which are in conflict with the terms of any applicable law or regulation governing this policy are hereby amended to conform to such laws and regulations.

G. When "Loss" is Payable

Coverage under this policy will not apply unless and until the insured or the insured's "underlying insurance" is obligated to pay the full amount of the "underlying limits of insurance."

When the amount of "loss" has finally been determined, we will promptly pay on behalf of the insured the amount of "loss" falling within the terms of this policy.

If the insured has rights to recover all or part of any payment we have made under this policy, then those rights are transferred to us and the insured must do nothing to impair those rights. At our request the insured will bring suit or transfer those rights to us to enforce them.

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CNA PARAMOUNT

Contractors' General Liability Extension Endorsement - New York

It is understood and agreed that this endorsement amends the **COMMERCIAL GENERAL LIABILITY COVERAGE PART** as follows. If any other endorsement attached to this policy amends any provision also amended by this endorsement, then that other endorsement controls with respect to such provision, and the changes made by this endorsement with respect to such provision do not apply.

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2. **Additional Insured - Primary And Non-Contributory To Additional Insured's Insurance**
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5. **Broad Named Insured**
6. **Broadened Liability Coverage For Damage To Your Product And Your Work**
7. **Contractual Liability - Railroads**
8. **Electronic Data Liability**
9. **Estates, Legal Representatives and Spouses**
10. **Expected Or Intended Injury – Exception for Reasonable Force**
11. **General Aggregate Limits of Insurance – Per Project**
12. **In Rem Actions**
13. **Incidental Health Care Malpractice Coverage**
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15. **Legal Liability – Damage To Premises / Alienated Premises / Property In The Named Insured's Care, Custody or Control**
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22. **Property Damage - Elevators**
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24. **Unintentional Failure To Disclose Hazards**
25. **Waiver of Subrogation – Blanket**
26. **Wrap-Up Extension: OCIP CCIP, or Consolidated (Wrap-Up) Insurance Programs**

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1. ADDITIONAL INSUREDS

a. **WHO IS AN INSURED** is amended to include as an **Insured** any person or organization described in paragraphs **A.** through **H.** below whom a **Named Insured** is required to add as an additional insured on this **Coverage Part** under a written contract or written agreement, provided such contract or agreement:

(1) is currently in effect or becomes effective during the term of this **Coverage Part**; and

(2) was executed prior to:

(a) the **bodily injury** or **property damage**; or

(b) the offense that caused the **personal and advertising injury**,

for which such additional insured seeks coverage.

b. However, subject always to the terms and conditions of this policy, including the limits of insurance, the Insurer will not provide such additional insured with:

(1) a higher limit of insurance than required by such contract or agreement; or

(2) coverage broader than required by such contract or agreement, and in no event broader than that described by the applicable paragraph **A.** through **H.** below.

Any coverage granted by this endorsement shall apply only to the extent permissible by law.

A. Controlling Interest

Any person or organization with a controlling interest in a **Named Insured**, but only with respect to such person or organization's liability for **bodily injury**, **property damage** or **personal and advertising injury** arising out of:

1. such person or organization's financial control of a **Named Insured**; or

2. premises such person or organization owns, maintains or controls while a **Named Insured** leases or occupies such premises;

provided that the coverage granted by this paragraph does not apply to structural alterations, new construction or demolition operations performed by, on behalf of, or for such additional insured.

B. Co-owner of Insured Premises

A co-owner of a premises co-owned by a **Named Insured** and covered under this insurance but only with respect to such co-owner's liability for **bodily injury**, **property damage** or **personal and advertising injury** as co-owner of such premises.

C. Lessor of Equipment

Any person or organization from whom a **Named Insured** leases equipment, but only with respect to liability for **bodily injury**, **property damage** or **personal and advertising injury** caused, in whole or in part, by the **Named Insured's** maintenance, operation or use of such equipment, provided that the **occurrence** giving rise to such **bodily injury**, **property damage** or the offense giving rise to such **personal and advertising injury** takes place prior to the termination of such lease.

D. Lessor of Land

Any person or organization from whom a **Named Insured** leases land but only with respect to liability for **bodily injury**, **property damage** or **personal and advertising injury** arising out of the ownership, maintenance or use of such land, provided that the **occurrence** giving rise to such **bodily injury**, **property damage** or the offense giving rise to such **personal and advertising injury** takes place prior to the termination of such lease. The

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coverage granted by this paragraph does not apply to structural alterations, new construction or demolition operations performed by, on behalf of, or for such additional insured.

E. Lessor of Premises

An owner or lessor of premises leased to the **Named Insured**, or such owner or lessor's real estate manager, but only with respect to liability for **bodily injury**, **property damage** or **personal and advertising injury** arising out of the ownership, maintenance or use of such part of the premises leased to the **Named Insured**, and provided that the **occurrence** giving rise to such **bodily injury** or **property damage**, or the offense giving rise to such **personal and advertising injury**, takes place prior to the termination of such lease. The coverage granted by this paragraph does not apply to structural alterations, new construction or demolition operations performed by, on behalf of, or for such additional insured.

F. Mortgagee, Assignee or Receiver

A mortgagee, assignee or receiver of premises but only with respect to such mortgagee, assignee or receiver's liability for **bodily injury**, **property damage** or **personal and advertising injury** arising out of the **Named Insured's** ownership, maintenance, or use of a premises by a **Named Insured**.

The coverage granted by this paragraph does not apply to structural alterations, new construction or demolition operations performed by, on behalf of, or for such additional insured.

G. State or Governmental Agency or Subdivision or Political Subdivisions – Permits

A state or governmental agency or subdivision or political subdivision that has issued a permit or authorization but only with respect to such state or governmental agency or subdivision or political subdivision's liability for **bodily injury**, **property damage** or **personal and advertising injury** arising out of:

1. the following hazards in connection with premises a **Named Insured** owns, rents, or controls and to which this insurance applies:

a. the existence, maintenance, repair, construction, erection, or removal of advertising signs, awnings, canopies, cellar entrances, coal holes, driveways, manholes, marquees, hoistaway openings, sidewalk vaults, street banners, or decorations and similar exposures; or

b. the construction, erection, or removal of elevators; or

c. the ownership, maintenance or use of any elevators covered by this insurance; or

2. the permitted or authorized operations performed by a **Named Insured** or on a **Named Insured's** behalf.

The coverage granted by this paragraph does not apply to:

a. **Bodily injury**, **property damage** or **personal and advertising injury** arising out of operations performed for the state or governmental agency or subdivision or political subdivision; or

b. **Bodily injury** or **property damage** included within the **products-completed operations hazard**.

With respect to this provision's requirement that additional insured status must be requested under a written contract or agreement, the Insurer will treat as a written contract any governmental permit that requires the **Named Insured** to add the governmental entity as an additional insured.

H. Trade Show Event Lessor

1. With respect to a **Named Insured's** participation in a trade show event as an exhibitor, presenter or displayer, any person or organization whom the **Named Insured** is required to include as an additional insured, but only with respect to such person or organization's liability for **bodily injury**, **property damage** or **personal and advertising injury** caused by:

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a. the **Named Insured's** acts or omissions; or

b. the acts or omissions of those acting on the **Named Insured's** behalf,

in the performance of the **Named Insured's** ongoing operations at the trade show event premises during the trade show event.

2. The coverage granted by this paragraph does not apply to **bodily injury** or **property damage** included within the **products-completed operations hazard**.

2. ADDITIONAL INSURED - PRIMARY AND NON-CONTRIBUTORY TO ADDITIONAL INSURED'S INSURANCE

The **Other Insurance** Condition in the **COMMERCIAL GENERAL LIABILITY CONDITIONS** Section is amended to add the following paragraph:

If the **Named Insured** has agreed in writing in a contract or agreement that this insurance is primary and non-contributory relative to an additional insured's own insurance, then this insurance is primary, and the Insurer will not seek contribution from that other insurance. For the purpose of this Provision **2.**, the additional insured's own insurance means insurance on which the additional insured is a named insured. Otherwise, and notwithstanding anything to the contrary elsewhere in this Condition, the insurance provided to such person or organization is excess of any other insurance available to such person or organization.

3. BODILY INJURY – EXPANDED DEFINITION

Under **DEFINITIONS**, the definition of **bodily injury** is deleted and replaced by the following:

Bodily injury means physical injury, sickness, shock, humiliation, disability or disease, mental injury or mental anguish sustained by a person, including death resulting from any of these.

4. BROAD KNOWLEDGE OF OCCURRENCE/ NOTICE OF OCCURRENCE

Under **CONDITIONS**, the condition entitled **Duties in The Event of Occurrence, Offense, Claim or Suit** is amended to add the following provisions:

A. BROAD KNOWLEDGE OF OCCURRENCE

The **Named Insured** must give the Insurer or the Insurer's authorized representative notice of an **occurrence**, offense or **claim** only when the **occurrence**, offense or **claim** is known to a natural person **Named Insured**, to a partner, executive officer, manager or member of a **Named Insured**, or an **employee** designated by any of the above to give such notice.

B. NOTICE OF OCCURRENCE

The **Named Insured's** rights under this **Coverage Part** will not be prejudiced if the **Named Insured** fails to give the Insurer notice of an **occurrence**, offense or **claim** and that failure is solely due to the **Named Insured's** reasonable belief that the **bodily injury** or **property damage** is not covered under this **Coverage Part**. However, the **Named Insured** shall give written notice of such **occurrence**, offense or **claim** to the Insurer as soon as the **Named Insured** is aware that this insurance may apply to such **occurrence**, offense or **claim**.

5. BROAD NAMED INSURED

WHO IS AN INSURED is amended to delete its Paragraph **3.** in its entirety and replace it with the following:

3. Pursuant to the limitations described in Paragraph **4.** below, any organization in which a **Named Insured** has management control:

a. on the effective date of this **Coverage Part**; or

b. by reason of a **Named Insured** creating or acquiring the organization during the **policy period**,

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qualifies as a **Named Insured**, provided that there is no other similar liability insurance, whether primary, contributory, excess, contingent or otherwise, which provides coverage to such organization, or which would have provided coverage but for the exhaustion of its limit, and without regard to whether its coverage is broader or narrower than that provided by this insurance.

But this **BROAD NAMED INSURED** provision does not apply to:

(a) any partnership, limited liability company or joint venture; or

(b) any organization for which coverage is excluded by another endorsement attached to this **Coverage Part**.

For the purpose of this provision, management control means:

A. owning interests representing more than 50% of the voting, appointment or designation power for the selection of a majority of the Board of Directors of a corporation; or

B. having the right, pursuant to a written trust agreement, to protect, control the use of, encumber or transfer or sell property held by a trust.

4. With respect to organizations which qualify as **Named Insureds** by virtue of Paragraph **3.** above, this insurance does not apply to:

a. **bodily injury** or **property damage** that first occurred prior to the date of management control, or that first occurs after management control ceases; nor

b. **personal or advertising injury** caused by an offense that first occurred prior to the date of management control or that first occurs after management control ceases.

5. The insurance provided by this **Coverage Part** applies to **Named Insureds** when trading under their own names or under such other trading names or doing-business-as names (dba) as any **Named Insured** should choose to employ.

6. BROADENED LIABILITY COVERAGE FOR DAMAGE TO YOUR PRODUCT AND YOUR WORK

A. Under **COVERAGES**, **Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to delete exclusions **k.** and **l.** and replace them with the following:

This insurance does not apply to:

k. Damage to Your Product

Property damage to **your product** arising out of it, or any part of it except when caused by or resulting from:

(1) fire;

(2) smoke;

(3) collapse; or

(4) explosion.

l. Damage to Your Work

Property damage to **your work** arising out of it, or any part of it and included in the **products-completed operations hazard**.

This exclusion does not apply:

(1) If the damaged work, or the work out of which the damage arises, was performed on the **Named Insured's** behalf by a subcontractor; or

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(2) If the cause of loss to the damaged work arises as a result of:

(a) fire;

(b) smoke;

(c) collapse; or

(d) explosion.

B. The following paragraph is added to **LIMITS OF INSURANCE**:

Subject to **5.** above, $100,000 is the most the Insurer will pay under **Coverage A** for the sum of **damages** arising out of any one **occurrence** because of **property damage** to **your product** and **your work** that is caused by fire, smoke, collapse or explosion and is included within the **product-completed operations hazard**. This sublimit does not apply to **property damage** to **your work** if the damaged work, or the work out of which the damage arises, was performed on the **Named Insured's** behalf by a subcontractor.

C. This **Broadened Liability Coverage For Damage To Your Product And Your Work** Provision does not apply if an endorsement of the same name is attached to this policy.

7. CONTRACTUAL LIABILITY – RAILROADS

With respect to operations performed within 50 feet of railroad property, the definition of **insured contract** is replaced by the following:

Insured Contract means:

a. A contract for a lease of premises. However, that portion of the contract for a lease of premises that indemnifies any person or organization for damage by fire to premises while rented to a **Named Insured** or temporarily occupied by a **Named Insured** with permission of the owner is not an **insured contract**;

b. A sidetrack agreement;

c. Any easement or license agreement;

d. An obligation, as required by ordinance, to indemnify a municipality, except in connection with work for a municipality;

e. An elevator maintenance agreement;

f. That part of any other contract or agreement pertaining to the **Named Insured's** business (including an indemnification of a municipality in connection with work performed for a municipality) under which the **Named Insured** assumes the tort liability of another party to pay for **bodily injury** or **property damage** to a third person or organization. Tort liability means a liability that would be imposed by law in the absence of any contract or agreement.

Paragraph **f.** does not include that part of any contract or agreement:

(1) That indemnifies an architect, engineer or surveyor for injury or damage arising out of:

(a) Preparing, approving or failing to prepare or approve maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or

(b) Giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage;

(2) Under which the **Insured**, if an architect, engineer or surveyor, assumes liability for an injury or damage arising out of the insured's rendering or failure to render professional services, including those listed in **(1)** above and supervisory, inspection, architectural or engineering activities.

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8. ELECTRONIC DATA LIABILITY

A. Under **COVERAGES**, **Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to delete exclusion **p. Electronic Data** and replace it with the following:

This insurance does not apply to:

p. Access Or Disclosure Of Confidential Or Personal Information And Data-related Liability

Damages arising out of:

(1) any access to or disclosure of any person's or organization's confidential or personal information, including patents, trade secrets, processing methods, customer lists, financial information, credit card information, health information or any other type of nonpublic information; or

(2) the loss of, loss of use of, damage to, corruption of, inability to access, or inability to manipulate **electronic data** that does not result from physical injury to tangible property.

The above exclusions apply even if damages are claimed for notification costs, credit monitoring expenses, forensic expenses, public relation expenses or any other loss, cost or expense incurred by the **Named Insured** or others arising out of that which is described in Paragraph **(1)** or **(2)** above.

However, unless Paragraph **(1)** above applies, this exclusion does not apply to **damages** because of **bodily injury**.

B. The following paragraph is added to **LIMITS OF INSURANCE**:

Subject to **5.** above, $100,000 is the most the Insurer will pay under **Coverage A** for all **damages** arising out of any one **occurrence** because of **property damage** that results from physical injury to tangible property and arises out of **electronic data**.

C. The following definition is added to **DEFINITIONS**:

Electronic data means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software (including systems and applications software), hard or floppy disks, CD-ROMS, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

D. For the purpose of the coverage provided by this **ELECTRONIC DATA LIABILITY** Provision, the definition of **property damage** in **DEFINITIONS** is replaced by the following:

Property damage means:

a. Physical injury to tangible property, including all resulting loss of use of that property. All such loss of use shall be deemed to occur at the time of the physical injury that caused it;

b. Loss of use of tangible property that is not physically injured. All such loss of use shall be deemed to occur at the time of the **occurrence** that caused it; or

c. Loss of, loss of use of, damage to, corruption of, inability to access, or inability to properly manipulate **electronic data**, resulting from physical injury to tangible property. All such loss of **electronic data** shall be deemed to occur at the time of the **occurrence** that caused it.

For the purposes of this insurance, **electronic data** is not tangible property.

9. ESTATES, LEGAL REPRESENTATIVES, AND SPOUSES

The estates, heirs, legal representatives and **spouses** of any natural person **Insured** shall also be insured under this policy; provided, however, coverage is afforded to such estates, heirs, legal representatives, and **spouses** only for **claims** arising solely out of their capacity or status as such and, in the case of a **spouse**, where such **claim** seeks

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damages from marital community property, jointly held property or property transferred from such natural person **Insured** to such **spouse**. No coverage is provided for any act, error or omission of an estate, heir, legal representative, or **spouse** outside the scope of such person's capacity or status as such, provided however that the **spouse** of a natural person **Named Insured** and the **spouses** of members or partners of joint venture or partnership **Named Insureds** are **Insureds** with respect to such **spouses'** acts, errors or omissions in the conduct of the **Named Insured's** business.

10. EXPECTED OR INTENDED INJURY – EXCEPTION FOR REASONABLE FORCE

Under **COVERAGES, Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to delete the exclusion entitled **Expected or Intended Injury** and replace it with the following:

This insurance does not apply to:

Expected or Intended Injury

Bodily injury or **property damage** expected or intended from the standpoint of the **Insured**. This exclusion does not apply to **bodily injury** or **property damage** resulting from the use of reasonable force to protect persons or property.

11. GENERAL AGGREGATE LIMITS OF INSURANCE - PER PROJECT

A. For each construction project away from premises the **Named Insured** owns or rents, a separate Construction Project General Aggregate Limit, equal to the amount of the General Aggregate Limit shown in the Declarations, is the most the Insurer will pay for the sum of:

1. All **damages** under **Coverage A**, except **damages** because of **bodily injury** or **property damage** included in the **products-completed operations hazard**; and
2. All medical expenses under **Coverage C**,

that arise from **occurrences** or accidents which can be attributed solely to ongoing operations at that construction project. Such payments shall not reduce the General Aggregate Limit shown in the Declarations, nor the Construction Project General Aggregate Limit of any other construction project.

B. All:

1. **Damages** under **Coverage B**, regardless of the number of locations or construction projects involved;
2. **Damages** under **Coverage A**, caused by **occurrences** which cannot be attributed solely to ongoing operations at a single construction project, except **damages** because of **bodily injury** or **property damage** included in the **products-completed operations hazard**; and
3. Medical expenses under **Coverage C** caused by accidents which cannot be attributed solely to ongoing operations at a single construction project,

will reduce the General Aggregate Limit shown in the Declarations.

C. The limits shown in the Declarations for Each Occurrence, for Damage To Premises Rented To You and for Medical Expense continue to apply, but will be subject to either the Construction Project General Aggregate Limit or the General Aggregate Limit shown in the Declarations, depending on whether the **occurrence** can be attributed solely to ongoing operations at a particular construction project.

D. When coverage for liability arising out of the **products-completed operations hazard** is provided, any payments for **damages** because of **bodily injury** or **property damage** included in the **products-completed operations hazard** will reduce the Products-Completed Operations Aggregate Limit shown in the Declarations, regardless of the number of projects involved.

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E. If a single construction project away from premises owned by or rented to the **Insured** has been abandoned and then restarted, or if the authorized contracting parties deviate from plans, blueprints, designs, specifications or timetables, the project will still be deemed to be the same construction project.

F. The provisions of **LIMITS OF INSURANCE** not otherwise modified by this endorsement shall continue to apply as stipulated.

12. IN REM ACTIONS

A quasi in rem action against any vessel owned or operated by or for the **Named Insured**, or chartered by or for the **Named Insured**, will be treated in the same manner as though the action were in personam against the **Named Insured**.

13. INCIDENTAL HEALTH CARE MALPRACTICE COVERAGE

Solely with respect to **bodily injury** that arises out of a **health care incident**:

A. Under **COVERAGES**, **Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Insuring Agreement** is amended to replace Paragraphs **1.b.(1)** and **1.b.(2)** with the following:

b. This insurance applies to **bodily injury** provided that the professional health care services are incidental to the **Named Insured's** primary business purpose, and only if:

(1) such **bodily injury** is caused by an **occurrence** that takes place in the **coverage territory**.

(2) the **bodily injury** first occurs during the **policy period**. All **bodily injury** arising from an **occurrence** will be deemed to have occurred at the time of the first act, error, or omission that is part of the **occurrence**; and

B. Under **COVERAGES**, **Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to:

i. add the following to the **Employers Liability** exclusion:

This exclusion applies only if the **bodily injury** arising from a **health care incident** is covered by other liability insurance available to the **Insured** (or which would have been available but for exhaustion of its limits).

ii. delete the exclusion entitled **Contractual Liability** and replace it with the following:

This insurance does not apply to:

Contractual Liability

the **Insured's** actual or alleged liability under any oral or written contract or agreement, including but not limited to express warranties or guarantees.

iii. add the following additional exclusions:

This insurance does not apply to:

Discrimination

any actual or alleged discrimination, humiliation or harassment, including but not limited to **claims** based on an individual's race, creed, color, age, gender, national origin, religion, disability, marital status or sexual orientation.

Dishonesty or Crime

Any actual or alleged dishonest, criminal or malicious act, error or omission.

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Medicare/Medicaid Fraud

any actual or alleged violation of law with respect to Medicare, Medicaid, Tricare or any similar federal, state or local governmental program.

Services Excluded by Endorsement

Any **health care incident** for which coverage is excluded by endorsement.

C. DEFINITIONS is amended to:

i. add the following definitions:

Health care incident means an act, error or omission by the **Named Insured's employees** or **volunteer workers** in the rendering of:

a. **professional health care services** on behalf of the **Named Insured** or

b. Good Samaritan services rendered in an emergency and for which no payment is demanded or received.

Professional health care services means any health care services or the related furnishing of food, beverages, medical supplies or appliances by the following providers in their capacity as such but solely to the extent they are duly licensed as required:

a. Physician;

b. Nurse;

c. Nurse practitioner;

d. Emergency medical technician;

e. Paramedic;

f. Dentist;

g. Physical therapist;

h. Psychologist;

i. Speech therapist;

j. Other allied health professional; or

Professional health care services does not include any services rendered in connection with human clinical trials or product testing.

ii. delete the definition of **occurrence** and replace it with the following:

Occurrence means a **health care incident**. All acts, errors or omissions that are logically connected by any common fact, circumstance, situation, transaction, event, advice or decision will be considered to constitute a single **occurrence**;

iii. amend the definition of **Insured** to:

a. add the following:

- the **Named Insured's employees** are **Insureds** with respect to:

(1) **bodily injury** to a co-**employee** while in the course of the co-**employee's** employment by the **Named Insured** or while performing duties related to the conduct of the **Named Insured's** business; and

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(2) **bodily injury** to a **volunteer worker** while performing duties related to the conduct of the **Named Insured's** business;

when such **bodily injury** arises out of a **health care incident**.

- the **Named Insured's volunteer workers** are **Insureds** with respect to:

(1) **bodily injury** to a co-**volunteer worker** while performing duties related to the conduct of the **Named Insured's** business; and

(2) **bodily injury** to an **employee** while in the course of the **employee's** employment by the **Named Insured** or while performing duties related to the conduct of the **Named Insured's** business;

when such **bodily injury** arises out of a **health care incident**.

b. delete Subparagraphs **(a)**, **(b)**, **(c) and (d)** of Paragraph **2.a.(1)** of **WHO IS AN INSURED**.

D. The **Other Insurance** condition is amended to delete Paragraph **b.(1)** in its entirety and replace it with the following:

Other Insurance

b. Excess Insurance

(1) To the extent this insurance applies, it is excess over any other valid and collectible insurance, self-insurance or risk transfer instrument, whether primary, excess, contingent or on any other basis, except for insurance purchased specifically by the **Named Insured** to be excess of this coverage.

14. JOINT VENTURES / PARTNERSHIP / LIMITED LIABILITY COMPANIES

WHO IS AN INSURED is amended to delete its last paragraph and replace it with the following:

No person or organization is an **Insured** with respect to the conduct of any current or past partnership, joint venture or limited liability company that is not shown as a **Named Insured** in the Declarations, except that if the **Named Insured** was a joint venturer, partner, or member of a limited liability company and such joint venture, partnership or limited liability company terminated prior to or during the **policy period**, such **Named Insured** is an **Insured** with respect to its interest in such joint venture, partnership or limited liability company but only to the extent that:

a. any offense giving rise to **personal and advertising injury** occurred prior to such termination date, and the **personal and advertising injury** arising out of such offense first occurred after such termination date;

b. the **bodily injury** or **property damage** first occurred after such termination date; and

c. there is no other valid and collectible insurance purchased specifically to insure the partnership, joint venture or limited liability company; and

If the joint venture, partnership or limited liability company is or was insured under a **consolidated (wrap-up) insurance program**, then such insurance will always be considered valid and collectible for the purpose of paragraph **c.** above. But this provision will not serve to exclude **bodily injury**, **property damage** or **personal and advertising injury** that would otherwise be covered under the **Contractors General Liability Extension Endorsement** provision entitled **WRAP-UP EXTENSION: OCIP, CCIP, OR CONSOLIDATED (WRAP-UP) INSURANCE PROGRAMS.** Please see that provision for the definition of **consolidated (wrap-up) insurance program**.

15. LEGAL LIABILITY – DAMAGE TO PREMISES / ALIENATED PREMISES / PROPERTY IN THE NAMED INSURED'S CARE, CUSTODY OR CONTROL

A. Under **COVERAGES, Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to delete exclusion **j. Damage to Property** in its entirety and replace it with the following:

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This insurance does not apply to:

j. Damage to Property

Property damage to:

(1) Property the **Named Insured** owns, rents, or occupies, including any costs or expenses incurred by you, or any other person, organization or entity, for repair, replacement, enhancement, restoration or maintenance of such property for any reason, including prevention of injury to a person or damage to another's property;

(2) Premises the **Named Insured** sells, gives away or abandons, if the **property damage** arises out of any part of those premises;

(3) Property loaned to the **Named Insured**;

(4) Personal property in the care, custody or control of the **Insured**;

(5) That particular part of real property on which the **Named Insured** or any contractors or subcontractors working directly or indirectly on the **Named Insured's** behalf are performing operations, if the **property damage** arises out of those operations; or

(6) That particular part of any property that must be restored, repaired or replaced because **your work** was incorrectly performed on it.

Paragraphs **(1), (3)** and **(4)** of this exclusion do not apply to **property damage** (other than damage by fire) to premises rented to the **Named Insured** or temporarily occupied by the **Named Insured** with the permission of the owner, nor to the contents of premises rented to the **Named Insured** for a period of 7 or fewer consecutive days. A separate limit of insurance applies to Damage To Premises Rented To You as described in **LIMITS OF INSURANCE**.

Paragraph **(2)** of this exclusion does not apply if the premises are **your work**.

Paragraphs **(3), (4), (5)** and **(6)** of this exclusion do not apply to liability assumed under a sidetrack agreement.

Paragraph **(6)** of this exclusion does not apply to **property damage** included in the **products-completed operations hazard**.

Paragraphs **(3)** and **(4)** of this exclusion do not apply to **property damage** to:

i. tools, or equipment the **Named Insured** borrows from others, nor

ii. other personal property of others in the **Named Insured's** care, custody or control;

while being used in the **Named Insured's** operations away from any **Named Insured's** premises. However, the coverage granted by this exception to Paragraphs **(3)** and **(4)** does not apply to:

a. property at a job site awaiting or during such property's installation, fabrication, or erection;

b. property that is **mobile equipment** leased by an **Insured**;

c. property that is an **auto**, aircraft or watercraft;

d. property in transit; or

e. any portion of **property damage** for which the **Insured** has available other valid and collectible insurance, or would have such insurance but for exhaustion of its limits, or but for application of one of its exclusions.

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A separate limit of insurance and deductible apply to such property of others. See **LIMITS OF INSURANCE** as amended below.

B. Under **COVERAGES, Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to delete its last paragraph and replace it with the following:

Exclusions **c.** through **n.** do not apply to damage by fire to premises while rented to a **Named Insured** or temporarily occupied by a **Named Insured** with permission of the owner, nor to damage to the contents of premises rented to a **Named Insured** for a period of 7 or fewer consecutive days.

A separate limit of insurance applies to this coverage as described in **LIMITS OF INSURANCE**.

C. The following paragraph is added to **LIMITS OF INSURANCE**:

Subject to **5.** above, $25,000 is the most the Insurer will pay under **Coverage A** for **damages** arising out of any one **occurrence** because of the sum of all **property damage** to borrowed tools or equipment, and to other personal property of others in the **Named Insured's** care, custody or control, while being used in the **Named Insured's** operations away from any **Named Insured's** premises. The Insurer's obligation to pay such **property damage** does not apply until the amount of such **property damage** exceeds $1,000.

D. Paragraph **6.**, Damage To Premises Rented To You Limit, of **LIMITS OF INSURANCE** is deleted and replaced by the following:

6. Subject to Paragraph **5.** above, (the Each Occurrence Limit), the Damage To Premises Rented To You Limit is the most the Insurer will pay under **Coverage A** for **damages** because of **property damage** to any one premises while rented to the **Named Insured** or temporarily occupied by the **Named Insured** with the permission of the owner, including contents of such premises rented to the **Named Insured** for a period of 7 or fewer consecutive days. The Damage To Premises Rented To You Limit is the greater of:

a. $500,000; or

b. The Damage To Premises Rented To You Limit shown in the Declarations.

E. Paragraph **4.b.(1)(a)(ii)** of the **Other Insurance** Condition is deleted and replaced by the following:

(ii) That is property insurance for premises rented to the **Named Insured**, for premises temporarily occupied by the **Named Insured** with the permission of the owner; or for personal property of others in the **Named Insured's** care, custody or control;

16. LIQUOR LIABILITY

Under **COVERAGES, Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to delete the exclusion entitled **Liquor Liability**.

This **LIQUOR LIABILITY** provision does not apply to any person or organization who otherwise qualifies as an additional insured on this **Coverage Part**.

17. MEDICAL PAYMENTS

A. **LIMITS OF INSURANCE** is amended to delete Paragraph **7.** (the Medical Expense Limit) and replace it with the following:

7. Subject to Paragraph **5.** above (the Each Occurrence Limit), the Medical Expense Limit is the most the Insurer will pay under **Coverage C – Medical Payments** for all medical expenses because of **bodily injury** sustained by any one person. The Medical Expense Limit is the greater of:

(1) $15,000 unless a different amount is shown here: ; or

(2) the amount shown in the Declarations for Medical Expense Limit.

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B. Under **COVERAGES**, the **Insuring Agreement** of **Coverage C – Medical Payments** is amended to replace Paragraph **1.a.(3)(b)** with the following:

(b) The expenses are incurred and reported to the Insurer within three years of the date of the accident; and

18. NON-OWNED AIRCRAFT

Under **COVERAGES, Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended as follows:

The exclusion entitled **Aircraft, Auto or Watercraft** is amended to add the following:

This exclusion does not apply to an aircraft not owned by any **Named Insured**, provided that:

1. the pilot in command holds a currently effective certificate issued by the duly constituted authority of the United States of America or Canada, designating that person as a commercial or airline transport pilot;

2. the aircraft is rented with a trained, paid crew to the **Named Insured**; and

3. the aircraft is not being used to carry persons or property for a charge.

19. NON-OWNED WATERCRAFT

Under **COVERAGES, Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended to delete subparagraph **(2)** of the exclusion entitled **Aircraft, Auto or Watercraft**, and replace it with the following.

This exclusion does not apply to:

(2) a watercraft that is not owned by any **Named Insured**, provided the watercraft is:

(a) less than 75 feet long; and

(b) not being used to carry persons or property for a charge.

20. PERSONAL AND ADVERTISING INJURY –DISCRIMINATION OR HUMILIATION

A. Under **DEFINITIONS**, the definition of **personal and advertising injury** is amended to add the following tort:

- Discrimination or humiliation that results in injury to the feelings or reputation of a natural person.

B. Under **COVERAGES**, **Coverage B – Personal and Advertising Injury Liability**, the paragraph entitled **Exclusions** is amended to:

1. delete the Exclusion entitled **Knowing Violation Of Rights Of Another** and replace it with the following:

This insurance does not apply to:

Knowing Violation of Rights of Another

Personal and advertising injury caused by or at the direction of the **Insured** with the knowledge that the act would violate the rights of another and would inflict **personal and advertising injury**. This exclusion shall not apply to discrimination or humiliation that results in injury to the feelings or reputation of a natural person, but only if such discrimination or humiliation:

(a) is based solely on disparate impact or vicarious liability; and

(b) is not done intentionally by or at the direction of the **Named Insured**; or any **executive officer**, director, stockholder, partner, member or manager (if the **Named Insured** is a limited liability company) of the **Named Insured**.

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2. add the following exclusions:

This insurance does not apply to:

Employment Related Discrimination

Discrimination or humiliation directly or indirectly related to the employment, prospective employment, past employment or termination of employment of any person by any **Insured**.

Premises Related Discrimination

discrimination or humiliation arising out of the sale, rental, lease or sub-lease or prospective sale, rental, lease or sub-lease of any room, dwelling or premises by or at the direction of any **Insured**.

This exclusion shall not apply to discrimination or humiliation **based solely on either disparate impact or vicarious liability** that results in injury to the feelings or reputation of a natural person, but only if such discrimination or humiliation is not done intentionally by or at the direction of:

(a) the **Named Insured**; or

(b) any **executive officer**, director, stockholder, partner, member or manager (if the **Named Insured** is a limited liability company) of the **Named Insured**.

Notwithstanding the above, there is no coverage for fines or penalties levied or imposed by a governmental entity because of discrimination.

The coverage provided by this **PERSONAL AND ADVERTISING INJURY –DISCRIMINATION OR HUMILIATION** Provision does not apply to any person or organization whose status as an **Insured** derives solely from

- Provision **1. ADDITIONAL INSURED** of this endorsement; or
- attachment of an additional insured endorsement to this **Coverage Part**.

This **PERSONAL AND ADVERTISING INJURY –DISCRIMINATION OR HUMILIATION** Provision does not apply to any person or organization who otherwise qualifies as an additional insured on this **Coverage Part**.

21. PERSONAL AND ADVERTISING INJURY - CONTRACTUAL LIABILITY

A. Under **COVERAGES**, **Coverage B –Personal and Advertising Injury Liability**, the paragraph entitled **Exclusions** is amended to delete the exclusion entitled **Contractual Liability**.

B. Solely for the purpose of the coverage provided by this **PERSONAL AND ADVERTISING INJURY - CONTRACTUAL LIABILITY** provision, the following changes are made to the section entitled **SUPPLEMENTARY PAYMENTS – COVERAGES A AND B:**

1. Paragraph **2.d.** is replaced by the following:

d. The allegations in the **suit** and the information the Insurer knows about the offense alleged in such **suit** are such that no conflict appears to exist between the interests of the **Insured** and the interests of the indemnitee;

2. The first unnumbered paragraph beneath Paragraph **2.f.(2)(b)** is deleted and replaced by the following:

So long as the above conditions are met, attorneys fees incurred by the Insurer in the defense of that indemnitee, necessary litigation expenses incurred by the Insurer, and necessary litigation expenses incurred by the indemnitee at the Insurer's request will be paid as **defense costs**. Such payments will not be deemed to be **damages** for **personal and advertising injury** and will not reduce the limits of insurance.

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C. This **PERSONAL AND ADVERTISING INJURY - CONTRACTUAL LIABILITY** Provision does not apply if **Coverage B –Personal and Advertising Injury Liability** is excluded by another endorsement attached to this **Coverage Part**.

This **PERSONAL AND ADVERTISING INJURY - CONTRACTUAL LIABILITY** Provision does not apply to any person or organization who otherwise qualifies as an additional insured on this **Coverage Part**.

22. PROPERTY DAMAGE – ELEVATORS

A. Under **COVERAGES**, **Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended such that the **Damage to Your Product** Exclusion and subparagraphs **(3)**, **(4)** and **(6)** of the **Damage to Property** Exclusion do not apply to **property damage** that results from the use of elevators.

B. Solely for the purpose of the coverage provided by this **PROPERTY DAMAGE – ELEVATORS** Provision, the **Other Insurance** conditions is amended to add the following paragraph:

This insurance is excess over any other valid and collectible insurance, whether primary, excess, contingent or on any other basis that is Property insurance covering property of others damaged from the use of elevators.

23. SUPPLEMENTARY PAYMENTS

The section entitled **SUPPLEMENTARY PAYMENTS – COVERAGES A AND B** is amended as follows:

A. Paragraph **1.b.** is amended to delete the $250 limit shown for the cost of bail bonds and replace it with a $5,000. limit; and

B. Paragraph **1.d.** is amended to delete the limit of $250 shown for daily loss of earnings and replace it with a $1,000. limit.

24. UNINTENTIONAL FAILURE TO DISCLOSE HAZARDS

If the **Named Insured** unintentionally fails to disclose all existing hazards at the inception date of the **Named Insured's Coverage Part**, the Insurer will not deny coverage under this **Coverage Part** because of such failure.

25. WAIVER OF SUBROGATION - BLANKET

Under **CONDITIONS**, the condition entitled **Transfer Of Rights Of Recovery Against Others To Us** is amended to add the following:

The Insurer waives any right of recovery the Insurer may have against any person or organization because of payments the Insurer makes for injury or damage arising out of:

1. the **Named Insured's** ongoing operations; or

2. **your work** included in the **products-completed operations hazard**.

However, this waiver applies only when the **Named Insured** has agreed in writing to waive such rights of recovery in a written contract or written agreement, and only if such contract or agreement:

1. is in effect or becomes effective during the term of this **Coverage Part**; and

2. was executed prior to the **bodily injury**, **property damage** or **personal and advertising injury** giving rise to the **claim**.

26. WRAP-UP EXTENSION: OCIP, CCIP, OR CONSOLIDATED (WRAP-UP) INSURANCE PROGRAMS

Note: The following provision does not apply to any public construction project in the state of Oklahoma, nor to any construction project in the state of Alaska, that is not permitted to be insured under a **consolidated (wrap-up) insurance program** by applicable state statute or regulation.

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CNA PARAMOUNT

Contractors' General Liability Extension Endorsement - New York

If the endorsement **EXCLUSION – CONSTRUCTION WRAP-UP** is attached to this policy, or another exclusionary endorsement pertaining to Owner Controlled Insurance Programs (O.C.I.P.) or Contractor Controlled Insurance Programs (C.C.I.P.) is attached, then the following changes apply:

A. The following wording is added to the above-referenced endorsement:

With respect to a **consolidated (wrap-up) insurance program** project in which the **Named Insured** is or was involved, this exclusion does not apply to those sums the **Named Insured** become legally obligated to pay as **damages** because of:

1. **Bodily injury**, **property damage**, or **personal or advertising injury** that occurs during the **Named Insured's** ongoing operations at the project, or during such operations of anyone acting on the **Named Insured's** behalf; nor
2. **Bodily injury** or **property damage** included within the **products-completed operations hazard** that arises out of those portions of the project that are not **residential structures**.

B. Condition **4. Other Insurance** is amend to add the following subparagraph **4.b.(1)(c)**:

This insurance is excess over:

(c) Any of the other valid and collectible insurance whether primary, excess, contingent or any other basis that is insurance available to the **Named Insured** as a result of the **Named Insured** being a participant in a **consolidated (wrap-up) insurance program**, but only as respects the **Named Insured's** involvement in that **consolidated (wrap-up) insurance program**.

C. **DEFINITIONS** is amended to add the following definitions:

Consolidated (wrap-up) insurance program means a construction, erection or demolition project for which the prime contractor/project manager or owner of the construction project has secured general liability insurance covering some or all of the contractors or subcontractors involved in the project, such as an Owner Controlled Insurance Program (O.C.I.P.) or Contractor Controlled Insurance Program (C.C.I.P.).

Residential structure means any structure where 30% or more of the square foot area is used or is intended to be used for human residency, including but not limited to:

1. single or multifamily housing, apartments, condominiums, townhouses, co-operatives or planned unit developments; and
2. the common areas and structures appurtenant to the structures in paragraph **1.** (including pools, hot tubs, detached garages, guest houses or any similar structures).

However, when there is no individual ownership of units, **residential structure** does not include military housing, college/university housing or dormitories, long term care facilities, hotels or motels. **Residential structure** also does not include hospitals or prisons.

This **WRAP-UP EXTENSION: OCIP, CCIP, OR CONSOLIDATED (WRAP-UP) INSURANCE PROGRAMS** Provision does not apply to any person or organization who otherwise qualifies as an additional insured on this **Coverage Part**.

All other terms and conditions of the Policy remain unchanged.

This endorsement, which forms a part of and is for attachment to the Policy issued by the designated Insurers, takes effect on the effective date of said Policy at the hour stated in said Policy, unless another effective date is shown below, and expires concurrently with said Policy.

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CNA PARAMOUNT

Policy Declarations

Policy Issued by:

Policy Number: 7015379257
Renewal of: 7015379257

Name: VALLEY FORGE INSURANCE COMPANY
Address: 151 N Franklin
CHICAGO, IL 60606

Producer's Information:

Producer Code: 089970

Name: ASSUREDPARTNERS NORTHEAST,LLC
Address: 100 BAYLIS RD STE 300

MELVILLE, NY 11747

1. Named Insured and mailing address:

Name: STALCO CONSTRUCTION INC.

Address: 1316 MOTOR PKWY

ISLANDIA, NY 11749-5225

2. Coverage Parts:

The **coverage parts** attached to and forming part of this Policy

Business Property
General Liability
Employee Benefits Liability

3. Policy Period:

Effective date from: 02/01/2025 to 02/01/2026 At 12:01 A.M. Standard Time at your mailing address shown above

4. Limits of Insurance and Deductibles:

See **Coverage Part** Declarations

5. Premium, Surcharges, Taxes and Fees at Issuance:

See **Coverage Part** Declarations for **Coverage Part** Premium, surcharges, taxes and fees

Total Premium and applicable taxes, surcharges and fees

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CNA PARAMOUNT
Construction
General Liability Coverage Part Declarations

Policy Number: 7015379257

1. Named Insured and mailing address

Name: STALCO CONSTRUCTION INC.

Address: 1316 MOTOR PKWY
ISLANDIA, NY 11749-5225

2. Type of Organization

Corporation

3. Limits of Insurance, Deductible

General Aggregate Limit	$4,000,000
Products/Completed Operations Aggregate Limit	$4,000,000
Personal And Advertising Injury Limit	$2,000,000
Each Occurrence Limit	$2,000,000
Damage To Premises Rented To You Limit	$1,000,000
Medical Expense Limit – Any One Person	$15,000

Deductible Applicable to Damages Endorsement, CNA75119 (see endorsement)

Additional Coverage Limited Pollution Liability Coverage - Worksites Endorsement, CNA74844 (see endorsement)

4. Premium, Surcharges Taxes and Fees at Issuance

Total Premium for this **Coverage Part**

Total Premium, Surcharges Taxes and Fees for this **Coverage Part**

Your Premium includes the following amount for Certified Acts of Terrorism

5. Audit Period: Annual

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or organization which may be liable to the **Insured** because of injury or damage to which this insurance may also apply; and

vi. will not voluntarily make a payment, except at its own cost, assume any obligation, or incur any expense, other than for first aid, without the Insurer's prior consent.

3. Cooperation

With respect to both **Coverage A - Excess Follow Form Liability** and **Coverage B – Umbrella Liability**, the **Named Insured** will cooperate with the Insurer in addressing all **claims** required to be reported to the Insurer in accordance with this paragraph **O. Notice of Claims/Crisis Management Event/Covered Accident,** and refuse, except solely at its own cost, to voluntarily, without the Insurer's approval, make any payment, admit liability, assume any obligation or incur any expense related thereto.

P. Notices

Any notices required to be given by an **Insured** shall be submitted in writing to the Insurer at the address set forth in the Declarations of this Policy.

Q. Other Insurance

If the **Insured** is entitled to be indemnified or otherwise insured in whole or in part for any **damages** or **defense costs** by any valid and collectible **other insurance** for which the **Insured** otherwise would have been indemnified or otherwise insured in whole or in part by this Policy, the limits of insurance specified in the Declarations of this Policy shall apply in excess of, and shall not contribute to a **claim**, **incident** or such event covered by such **other insurance.**

With respect to **Coverage A – Excess Follow Form Liability** only, if:

a. the **Named Insured** has agreed in writing in a contract or agreement with a person or entity that this insurance would be primary and would not seek contribution from any other insurance available;

b. **Underlying Insurance** includes that person or entity as an additional insured; and

c. **Underlying Insurance** provides coverage on a primary and noncontributory basis as respects that person or entity;

then this insurance is primary to and will not seek contribution from any insurance policy where that person or entity is a named insured.

R. Premium

All premium charges under this Policy will be computed according to the Insurer's rules and rating plans that apply at the inception of the current **policy period.** Premium charges may be paid to the Insurer or its authorized representative.

S. In Rem Actions

A quasi *in rem* action against any vessel owned or operated by or for a **Named Insured**, or chartered by or for a **Named Insured**, will be treated in the same manner as though the action were *in personam* against the **Named Insured.**

T. Separation of Insureds

Except with respect to the limits of insurance, and any rights or duties specifically assigned in this Policy to the **First Named Insured**, this insurance applies:

1. as if each **Named Insured** were the only **Named Insured**; and

2. separately to each **Insured** against whom a **claim** is made.

U. Transfer of Interest

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Assignment of interest under this policy shall not bind the Insurer unless its consent is endorsed hereon.

V. Unintentional Omission

Based on Insurer's reliance on the **Named Insured's** representations as to existing hazards, if the **Named Insured** should unintentionally fail to disclose all such hazards at the effective date of this Policy, the Insurer will not deny coverage under this Policy because of such failure.

W. Waiver of Rights of Recovery

The Insurer waives any right of recovery it may have against any person or organization because of payments the Insurer makes under this Policy if the **Named Insured** has agreed in writing to waive such rights of recovery in a contract or agreement, and only if the contract or agreement:

1. is in effect or becomes effective during the **policy period**; and
2. was executed prior to loss.

VII. DEFINITIONS

For purposes of this Policy, words in bold face type, whether expressed in the singular or the plural, have the meaning set forth below.

Advertisement means a notice that is broadcast or published to the general public or specific market segments about the **Named Insured's** goods, products or services for the purpose of attracting customers or supporters. For the purposes of this definition:

A. notices that are published include material placed on the Internet or on similar electronic means of communication; and

B. regarding web-sites, only that part of a web-site that is about the **Named Insured's** goods, products or services for the purposes of attracting customers or supporters is considered an **advertisement**.

Aircraft means any machine or device that is capable of atmospheric flight.

Arbitration proceeding means a formal alternative dispute resolution proceeding or administrative hearing to which an **Insured** is required to submit by statute or court rule or to which an **Insured** has submitted with the Insurer's consent.

Asbestos means the mineral in any form whether or not the asbestos was at any time airborne as a fiber, particle or dust, contained in or formed a part of a product, structure or other real or personal property, carried on clothing, inhaled or ingested, or transmitted by any other means.

Authorized Insured means any **executive officer**, member of the **Named Insured's** risk management or in-house general counsel's office, or any **employee** authorized by the **Named Insured** to give or receive notice of a **claim**.

Auto means:

A. a land motor vehicle, trailer or semitrailer designed for travel on public roads, including any attached machinery or equipment; or

B. any other land vehicle that is subject to a compulsory or financial responsibility law or other motor vehicle insurance law where it is licensed or principally garaged.

However, **auto** does not include **mobile equipment**.

Bodily injury means bodily injury, sickness or disease sustained by a person, including death, humiliation, shock, mental anguish or mental injury sustained by that person at any time which results as a consequence of the bodily injury, sickness or disease.

Claim means a:

A. suit; or

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POLICY DECLARATIONS

Named Insured and Mailing Address

Named Insured:
STALCO CONSTRUCTION INC

Mailing Address:
1316 MOTOR PKWY
ISLANDIA, NY 11749-5225

Policy Information

Policy Number: 7015379274

Renewal of: 7015379274

Insurer's Name and Address:
The Continental Insurance Company
151 N Franklin St
Chicago, IL 60606

Producer Information

Producer:
ASSUREDPARTNERS NORTHEAST, LLC
100 BAYLIS RD STE 300
MELVILLE, NY 11747-3840

Producer Code: 730-089970

Policy Period

02/01/2025 to **02/01/2026** at 12:01 a.m. Standard Time at your mailing address.

Limits of Insurance

Each **Incident Limit**	$5,000,000
Aggregate Limit	$5,000,000
Aggregate **Products-Completed Operations Hazard** Limit	$5,000,000
Policy Aggregate Limit	N/A
Crisis Management Expenses Aggregate Limit	$300,000
Key Employee Replacement Expenses Aggregate Limit	$100,000

Self-Insured Retention

Self-Insured Retention	$10,000

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Schedule of Underlying Insurance

Underlying Insurer Policy Number Policy Period Note:	Underlying Insurance	Coverages	Limits of Insurance
Valley Forge Insurance Company 7015379257 02/01/2025 to 02/01/2026	General Liability	Each Occurrence Limit General Aggregate Limit Per Location : no Per Project : yes Products/ Completed Operations Aggregate Limit Personal and Advertising Injury Liability Limit	$2,000,000 $4,000,000 $4,000,000 $2,000,000
Valley Forge Insurance Company 7015379257 02/01/2025 to 02/01/2026	Employee Benefits Liability	Each Employee Limit Aggregate Limit	$1,000,000 $1,000,000
Continental Casualty Company 7015379260 02/01/2025 to 02/01/2026	Auto Liability	Combined Single Limit	$1,000,000

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Schedule of Underlying Insurance

Underlying Insurer Policy Number Policy Period Note:	Underlying Insurance	Coverages	Limits of Insurance
National Fire Insurance Company of Hartford 7017815909 02/01/2025 to 02/01/2026	Employers Liability	Bodily Injury by Accident- Each Accident Limit Bodily Injury by Disease - Policy Limit Bodily Injury by Disease - Each Employee Limit	$1,000,000 $1,000,000 $1,000,000

IN ANY JURISDICTION, STATE, OR PROVINCE WHERE THE AMOUNT OF EMPLOYERS LIABILITY INSURANCE PROVIDED BY THE UNDERLYING INSURER(S) IS BY LAW "UNLIMITED", THE UNDERLYING EMPLOYERS LIABILITY LIMIT(S) SHOWN IN THE ABOVE SCHEDULE DO NOT APPLY AND NO COVERAGE SHALL BE PROVIDED FOR EMPLOYERS LIABILITY UNDER THIS POLICY.

Forms and Endorsements Attached to this Policy

See SCHEDULE OF FORMS AND ENDORSEMENTS

Premium

Minimum Earned Premium	0% of the Total Premium
Total Premium	
Premium includes the following amount for Certified Acts of Terrorism Coverage	

Notices

Notice to insurer

Address:	CNA Claims Reporting P.O. Box 8317 Chicago, IL 60680-8317
Fax #:	800-446-8632
Email Address:	HPReports@CNA.com

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Print Form

CITY OF NEW YORK
CERTIFICATION BY INSURANCE AGENT OR BROKER

The undersigned insurance broker or agent represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects.

AssuredPartners Northeast, LLC.

[Name of broker or agent (typewritten)]

100 Baylis Road, Suite 300, Melville, NY 11747

[Address of broker or agent (typewritten)]

debbie.saracino@assuredpartners.com

[Email address of broker or agent (typewritten)]

(631) 465-4000 / (631) 465-4005

Phone Number / Fax Number of broker or agenct (typewritten)]

Debra Saracino

[Signature of authorized officer of broker]

Debra Saracino, Chief Operating Officer

[Name and title of authorized official, broker or agent (typewritten)]

State of ...New York.....)
)ss.:
County of .....Suffolk.....)

Sworn to before me this

8th day of April, 2025

Vivian Weiss

NOTARY PUBLIC FOR THE STATE OF New York

VIVIAN WEISS
Notary Public - State of New York
NO. 01WE4949244
Qualified in Suffolk County
My Commission Expires April 3, 20__

7/6/27

NEW YORK STATE | Workers' Compensation Board

CERTIFICATE OF NYS WORKERS' COMPENSATION INSURANCE COVERAGE

1a. Legal Name & Address of Insured (use street address only) STALCO CONSTRUCTION INC 1316 MOTOR PARKWAY ISLANDIA, NY 11749 Work Location of Insured *(Only required if coverage is specifically limited to certain locations in New York State, i.e., a Wrap-Up Policy)*	1b. Business Telephone Number of Insured 6312546767 1c. NYS Unemployment Insurance Employer Registration Number of Insured 1d. Federal Employer Identification Number of Insured or Social Security Number 11-3149290
2. Name and Address of Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder) The City of New York Department of Design and Construction 30-30 Thomson Avenue Long Island City NY 11101-3045	3a. Name of Insurance Carrier Nat'l Fire Ins.Co.of Hartford 3b. Policy Number of Entity Listed in Box "1a" 7017815909 3c. Policy effective period 02/01/2025 to 02/01/2026 3d. The Proprietor, Partners or Executive Officers are ☐ included. (Only check box if all partners/officers included) ☒ all excluded or certain partners/officers excluded.

This certifies that the insurance carrier indicated above in box "3" insures the business referenced above in box "1a" for workers' compensation under the New York State Workers' Compensation Law. **(To use this form, New York (NY) must be listed under Item 3A on the INFORMATION PAGE of the workers' compensation insurance policy).** The Insurance Carrier or its licensed agent will send this Certificate of Insurance to the entity listed above as the certificate holder in box "2".

The insurance carrier must notify the above certificate holder and the Workers' Compensation Board within 10 days IF a policy is canceled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from the coverage indicated on this Certificate. (These notices may be sent by regular mail.) **Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in box "3c", whichever is earlier.**

This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policy listed, nor does it confer any rights or responsibilities beyond those contained in the referenced policy.

This certificate may be used as evidence of a Workers' Compensation contract of insurance only while the underlying policy is in effect.

Please Note: Upon cancellation of the workers' compensation policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Workers' Compensation Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law.

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has the coverage as depicted on this form.

Approved by: Phil Coletta
(Print name of authorized representative or licensed agent of insurance carrier)

Approved by: _____ 04/08/2025
(Signature) (Date)

Title: President

Telephone Number of authorized representative or licensed agent of insurance carrier: 631-465-4000

Please Note: Only insurance carriers and their licensed agents are authorized to issue Form C-105.2. Insurance brokers are NOT authorized to issue it.

Workers' Compensation Law

Section 57. Restriction on issue of permits and the entering into contracts unless compensation is secured.

1. The head of a state or municipal department, board, commission or office authorized or required by law to issue any permit for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, and notwithstanding any general or special statute requiring or authorizing the issue of such permits, shall not issue such permit unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter. Nothing herein, however, shall be construed as creating any liability on the part of such state or municipal department, board, commission or office to pay any compensation to any such employee if so employed.

2. The head of a state or municipal department, board, commission or office authorized or required by law to enter into any contract for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, notwithstanding any general or special statute requiring or authorizing any such contract, shall not enter into any such contract unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter.

WORKERS COMPENSATION AND EMPLOYERS LIABILITY POLICY INFORMATION PAGE

Policy Information

Coverage Provided By	Policy Number
National Fire Insurance Company of Hartford a Stock Insurance Company 151 N Franklin St Chicago, IL 60606 **NCCI Carrier Code: 12238**	**Policy Number:** WC 7 17815909 **Renewal of:** WC 7 17815909

Item 1 Named Insured and Mailing Address

STALCO CONSTRUCTION INC
1316 MOTOR PKWY
ISLANDIA, NY 11749-5225

Type of Entity: Corporation (Not Otherwise Classified)
FEIN Number: 11-3149290
Intrastate ID No.: 000140903

Producer Information

ASSUREDPARTNERS NORTHEAST, LLC
100 BAYLIS RD STE 300
MELVILLE, NY 11747-3840

Producer Processing Code: 730-089970

If there are other Named Insureds: See Name and Address Schedule attached.

If there are other work places not shown above: See Name and Address Schedule attached.

Item 2 Policy Period

02/01/2025 to 02/01/2026 at 12:01 a.m. Standard Time at the **Named Insured's** mailing address shown above.

Anniversary Rating Date: NONE

Item 3 A. Workers Compensation Insurance: Part One of this policy applies to the Workers Compensation Law of the states listed here:

States: NY

Item 3 B. Employers Liability Insurance: Part Two of this policy applies to work in each state listed in Item 3.A. The limits of our liability under Part Two are:

Bodily Injury by Accident	$1,000,000	each accident
Bodily Injury by Disease	$1,000,000	policy limit
Bodily Injury by Disease	$1,000,000	each employee

WC000001

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WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.

This agreement shall not operate directly or indirectly to benefit anyone not named in the Schedule.

Schedule

Any Person or Organization on whose behalf you are required to obtain this waiver of our right to recover from under a written contract or agreement.

The premium charge for the endorsement is reflected in the Schedule of Operations.

All other terms and conditions of the policy remain unchanged.

This endorsement, which forms a part of and is for attachment to the policy issued by the designated Insurers, takes effect on the Policy Effective Date of said policy at the hour stated in said policy, unless another effective date (the Endorsement Effective Date) is shown below, and expires concurrently with said policy unless another expiration date is shown below.

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NEW YORK STATE Workers' Compensation Board

CERTIFICATE OF INSURANCE COVERAGE
NYS DISABILITY AND PAID FAMILY LEAVE BENEFITS LAW

PART 1. To be completed by NYS disability and Paid Family Leave benefits carrier or licensed insurance agent of that carrier

1a. Legal Name & Address of Insured (use street address only)
STALCO CONSTRUCTION INC.
1316 MOTOR PARKWAY
ISLANDIA, NY 11749

Work Location of Insured *(Only required if coverage is specifically limited to certain locations in New York State, i.e., Wrap-Up Policy)*

1b. Business Telephone Number of Insured
6312546767

1c. Federal Employer Identification Number of Insured or Social Security Number
11-3149290

2. Name and Address of Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder)
The City of New York
Department of Design & Construction
30-30 Thomson Avenue
Long Island City, NY 11101-3045

3a. Name of Insurance Carrier
Standard Security Life Insurance Company of New York

3b. Policy Number of Entity Listed in Box 1a
74524-00

3c. Policy Effective Period
4/1/2016 to 4/7/2026

4. Policy provides the following benefits:
- [x] A. Both disability and Paid Family Leave benefits.
- [ ] B. Disability benefits only.
- [ ] C. Paid Family Leave benefits only.

5. Policy covers:
- [x] A. All of the employer's employees eligible under the NYS Disability and Paid Family Leave Benefits Law.
- [ ] B. Only the following class or classes of employer's employees:

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has NYS disability and/or Paid Family Leave benefits insurance coverage as described above.

Date Signed 4/8/2025 By _____
(Signature of insurance carrier's authorized representative or NYS licensed insurance agent of that insurance carrier)

Telephone Number (212) 355-4141 Name and Title TALIN CONTI/MGR. POLICY SERVICES

IMPORTANT: If Boxes 4A and 5A are checked, and this form is signed by the insurance carrier's authorized representative or NYS Licensed Insurance Agent of that carrier, this certificate is COMPLETE. Mail it directly to the certificate holder.

If Box 4B, 4C or 5B is checked, this certificate is NOT COMPLETE for purposes of Section 220, Subd. 8 of the NYS Disability and Paid Family Leave Benefits Law. It must be emailed to PAU@wcb.ny.gov or it can be mailed for completion to the Workers' Compensation Board, Plans Acceptance Unit, PO Box 5200, Binghamton, NY 13902-5200.

PART 2. To be completed by the NYS Workers' Compensation Board (Only if Box 4B, 4C or 5B of Part 1 has been checked)

State of New York
Workers' Compensation Board

According to information maintained by the NYS Workers' Compensation Board, the above-named employer has complied with the NYS Disability and Paid Family Leave Benefits Law(Article 9 of the Workers' Compensation Law) with respect to all of their employees.

Date Signed _____ By _____
(Signature of Authorized NYS Workers' Compensation Board Employee)

Telephone Number _____ Name and Title _____

Please Note: *Only insurance carriers licensed to write NYS disability and Paid Family Leave benefits insurance policies and NYS licensed insurance agents of those insurance carriers are authorized to issue Form DB-120.1.* ***Insurance brokers are NOT authorized to issue this form.***

Additional Instructions for Form DB-120.1

By signing this form, the insurance carrier identified in Box 3 on this form is certifying that it is insuring the business referenced in Box 1a for disability and/or Paid Family Leave benefits under the NYS Disability and Paid Family Leave Benefits Law. The insurance carrier or its licensed agent will send this Certificate of Insurance Coverage (Certificate)to the entity listed as the certificate holder in Box 2.

The insurance carrier must notify the above certificate holder and the Workers' Compensation Board within 10 days IF a policy is cancelled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from coverage indicated on this Certificate. (These notices may be sent by regular mail.) Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in Box 3c, whichever is earlier.

This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policy listed, nor does it confer any rights or responsibilities beyond those contained in the referenced policy.

This Certificate may be used as evidence of a NYS disability and/or Paid Family Leave benefits contract of insurance only while the underlying policy is in effect.

Please Note: Upon the cancellation of the disability and/or Paid Family Leave benefits policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Insurance Coverage for NYS disability and/or Paid Family Leave Benefits or other authorized proof that the business is complying with the mandatory coverage requirements of the NYS Disability and Paid Family Leave Benefits Law.

NYS DISABILITY AND PAID FAMILY LEAVE BENEFITS LAW

§220. Subd. 8

(a) The head of a state or municipal department, board, commission or office authorized or required by law to issue any permit for or in connection with any work involving the employment of employees in employment as defined in this article, and not withstanding any general or special statute requiring or authorizing the issue of such permits, shall not issue such permit unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that the payment of disability benefits and after January first, two thousand and twenty-one, the payment of family leave benefits for all employees has been secured as provided by this article. Nothing herein, however, shall be construed as creating any liability on the part of such state or municipal department, board, commission or office to pay any disability benefits to any such employee if so employed.

(b) The head of a state or municipal department, board, commission or office authorized or required by law to enter into any contract for or in connection with any work involving the employment of employees in employment as defined in this article and notwithstanding any general or special statute requiring or authorizing any such contract, shall not enter into any such contract unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that the payment of disability benefits and after January first, two thousand eighteen, the payment of family leave benefits for all employees has been secured as provided by this article.

LABOR LAW ARTICLE 8 - NYC PUBLIC WORKS

Workers, Laborers and Mechanics employed on a public work project must receive not less than the prevailing rate of wage and benefits for the classification of work performed by each upon such public work. Pursuant to New York Labor Law Article 8 the Comptroller of the City of New York has promulgated this schedule solely for Workers, Laborers and Mechanics engaged by private contractors on New York City public work projects. Prevailing rates are required to be annexed to and form part of the public work contract pursuant to Labor Law section 220 (3).

This schedule is a compilation of separate determinations of the prevailing rate of wage and supplements made by the Comptroller for each trade classification listed herein pursuant to Labor Law section 220 (5). The source of the wage and supplement rates, whether a collective bargaining agreement, survey data or other, is listed at the end of each classification.

Agency Chief Contracting Officers should contact the Bureau of Labor Law's Classification Unit with any questions concerning trade classifications, prevailing rates or prevailing practices with respect to procurement on New York City public work contracts. Contractors are advised to review the Comptroller's Prevailing Wage Schedule before bidding on public work contracts. Contractors with questions concerning trade classifications, prevailing rates or prevailing practices with respect to public work contracts in the procurement stage must contact the contracting agency responsible for the procurement.

Any error as to compensation under the prevailing wage law or other information as to trade classification, made by the contracting agency in the contract documents or in any other communication, will not preclude a finding against the contractor of prevailing wage violation.

Any questions concerning trade classifications, prevailing rates or prevailing practices on New York City public work contracts that have already been awarded may be directed to the Bureau of Labor Law's Classification Unit by calling (212) 669-4443. All callers must have the agency name and contract registration number available when calling with questions on public work contracts. Please direct all other compliance issues to: laborlaw@comptroller.nyc.gov or Bureau of Labor Law, Attn: Paul Brumlik, Office of the Comptroller, 1 Centre Street, Room 651, New York, N.Y. 10007.

Pursuant to Labor Law § 220 (3-a) (a), the appropriate schedule of prevailing wages and benefits must be posted in a prominent and accessible place at all public work sites along with the Construction Poster provided on our web site at comptroller.nyc.gov/wages. In addition, covered employees must be given the appropriate schedule of prevailing wages and benefits along with the Worker Notice provided on our web site at the time the public work project begins, and with the first paycheck to each such employee after July first of each year.

This schedule is applicable to work performed during the effective period, unless otherwise noted. Changes to this schedule are published on our web site comptroller.nyc.gov/wages. Contractors must pay the wages and supplements in effect when the worker, laborer, mechanic performs the work. Preliminary schedules for future one-year periods appear in the City Record on or about June 1 each succeeding year. Final schedules appear on or about July 1 in the City Record and on our web site comptroller.nyc.gov/wages.

Prevailing rates and ratios for apprentices are published in the Construction Apprentice Prevailing Wage Schedule. Pursuant to Labor Law § 220 (3-e), only apprentices who are individually registered in a bona fide program to which the employer contractor is a participant, registered with the

New York State Department of Labor, may be paid at the apprentice rates. Apprentices who are not so registered must be paid as journey persons.

New York City public work projects awarded pursuant to a Project Labor Agreement ("PLA") in accordance with Labor Law section 222 may have different labor standards for shift, premium and overtime work. Please refer to the PLA's pre-negotiated labor agreements for wage and benefit rates applicable to work performed outside of the regular workday. More information is available at the Mayor's Office of Contract Services (MOCS) web page at:

https://www1.nyc.gov/site/mocs/legal-forms/project-labor-agreements.page

All the provisions of Labor Law Article 8 remain applicable to PLA work including, but not limited to, the enforcement of prevailing wage requirements by the Comptroller in accordance with the trade classifications in this schedule; however, we will enforce shift, premium, overtime and other non-standard rates as they appear in a project's pre-negotiated labor agreement.

In order to meet their obligation to provide prevailing supplemental benefits to each covered employee, employers must either:

1) **Provide bona fide fringe benefits which cost the employer no less than the prevailing supplemental benefits rate; or**
2) **Supplement the employee's hourly wage by an amount no less than the prevailing supplemental benefits rate; or**
3) **Provide a combination of bona fide fringe benefits and wage supplements which cost the employer no less than the prevailing supplemental benefits rate in total.**

Although prevailing wage laws do not require employers to provide bona fide fringe benefits (as opposed to wage supplements) to their employees, other laws may. For example, the Employee Retirement Income Security Act, 29 U.S.C. § 1001 et seq., the Patient Protection and Affordable Care Act, 42 U.S.C. § 18001 et seq., and the New York City Paid Sick Leave Law, N.Y.C. Admin. Code § 20-911 et seq., require certain employers to provide certain benefits to their employees. Labor agreements to which employers are a party may also require certain benefits. The Comptroller's Office does not enforce these laws or agreements.

Employers must provide prevailing supplemental benefits at the straight time rate for each hour worked unless otherwise noted in the classification.

Paid Holidays, Vacation and Sick Leave when listed must be paid or provided in addition to the prevailing hourly supplemental benefit rate.

For more information, please refer to the Comptroller's Prevailing Wage Law Regulations in Title 44 of the Rules of the City of New York, Chapter 2, available at comptroller.nyc.gov/wages.

Paul Brumlik
Director of Classifications
Bureau of Labor Law

ADDENDUM

List of Amended Classifications

1. FLAGGER
2. LABORER - HEAVY & HIGHWAY
3. LABORER - PAVER & ROADBUILDER
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WELDER 93

ASBESTOS HANDLER

SEE HAZARDOUS MATERIAL HANDLER

BLASTER

Blaster

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $58.21
Supplemental Benefit Rate per Hour: $54.03

Blaster - Hydraulic Trac Drill

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $52.35
Supplemental Benefit Rate per Hour: $54.03

Blaster - Wagon: Air Trac: Quarry Bar: Drillrunners

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $51.52
Supplemental Benefit Rate per Hour: $54.03

Blaster - Journeyperson

(Laborer, Chipper/Jackhammer including Walk Behind Self Propelled Hydraulic Asphalt and Concrete Breakers and Hydro (Water) Demolition, Powder Carrier, Hydraulic Chuck Tender, Chuck Tender and Nipper)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $45.00
Supplemental Benefit Rate per Hour: $54.03

Blaster - Magazine Keepers: (Watch Person)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $22.50
Supplemental Benefit Rate per Hour: $54.03

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Christmas Day

Paid Holidays

Labor Day
Thanksgiving Day

Shift Rates

When two shifts are employed, single time rate shall be paid for each shift. When three shifts are found necessary, each shift shall work seven and one half hours (7 ½), but shall be paid for eight (8) hours of labor, and be permitted one half hour for lunch.

(Local #731)

BOILERMAKER

Boilermaker

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $67.38
Supplemental Benefit Rate per Hour: $49.33
Supplemental Note: For time and one half overtime - $73.42 For double overtime - $97.51

Overtime Description

For Repair and Maintenance work:
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
For New Construction work:
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day

Memorial Day
Independence Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Quadruple time the regular rate for work on the following holiday(s).
Labor Day

Paid Holidays
Good Friday
Day after Thanksgiving
Day before Christmas
Day before New Year's Day

Shift Rates
On jobs requiring two (2) or three (3) shifts, the first shift shall work eight (8) hours at the regular straight-time hourly rate. The second shift shall work eight (8) hours and receive eight hours at the regular straight time hourly rate plus two dollars ($2.00) per hour. The third shift shall work eight (8) hours and receive eight hours at the regular straight time hourly rate plus two dollars and twenty-five cents ($2.25) per hour.

(Local #5)

BRICKLAYER

Bricklayer

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $59.09
Supplemental Benefit Rate per Hour: $43.05

Overtime Description
Time and one half the regular rate after a 7 hour day. If working on a job that is predominately Pointer, Cleaner, Caulker work, then Time and one half the regular rate after an 8 hour day.

Overtime
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day

President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
The second shift wage rate shall be a 15% wage premium with no premium for supplemental benefits. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, eight hours will be paid at straight time rate for seven hours of work.

(Bricklayer District Council)

CARPENTER - BUILDING COMMERCIAL

Building Commercial

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $57.05
Supplemental Benefit Rate per Hour: $48.33

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
The second shift will receive one hour at the double time rate of pay for the last hour of the shift; eight hours pay for seven hours of work, nine hours pay for eight hours of work. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - HEAVY CONSTRUCTION WORK
(Construction of Engineered Structures and Building Foundations including all form work)

Heavy Construction Work

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $60.59
Supplemental Benefit Rate per Hour: $55.84

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate and the supplemental benefits shall be paid at the straight time rate. When two (2) or more shifts of Carpenters are employed, single time will be paid for each shift.

(Carpenters District Council)

CARPENTER - HIGH RISE CONCRETE FORMS

(Excludes Engineered Structures and Building Foundations)

Carpenter High Rise A

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $51.48
Supplemental Benefit Rate per Hour: $44.74

Carpenter High Rise B

Carpenter High Rise B worker is excluded from high risk operations such as erection decking, perimeter debris netting, leading edge work, self-climbing form systems, and the installation of cocoon systems unless directly supervised by a Carpenter High Rise A worker.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $40.89
Supplemental Benefit Rate per Hour: $18.05

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
The second shift wage rate shall be 113% of the straight time hourly wage rate. However, any shift beginning after 5:00 P.M. shall be paid at time and one half the regular hourly rate. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - SIDEWALK SHED, SCAFFOLD AND HOIST

Carpenter - Hod Hoist

(Assisted by Mason Tender)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $55.00
Supplemental Benefit Rate per Hour: $48.90

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates

The second shift will receive 112% of the straight time hourly rate. Benefit fund contributions shall be paid at the straight time rate. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - WOOD WATER STORAGE TANK

Tank Mechanic

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.83
Supplemental Benefit Rate per Hour: $25.32

Tank Helper

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $29.69
Supplemental Benefit Rate per Hour: $25.32

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays

New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Day after Thanksgiving
1/2 day on Christmas Eve if work is performed in the A.M.
Christmas Day
1/2 day on New Year's Eve if work is performed in the A.M.

Vacation

Employed for one (1) year.....one (1) week vacation (40 hours)
Employed for three (3) years.....two (2) weeks vacation (80 hours)

Employed for more than twenty (20) years.....three (3) weeks vacation (120 hours)

SICK LEAVE:
Two (2) sick days after being employed for twenty (20) years.

(Carpenters District Council)

CEMENT & CONCRETE WORKER
Building Work

Cement & Concrete Worker

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.28
Supplemental Benefit Rate per Hour: $32.20
Supplemental Note: $36.70 on Saturdays; $41.20 on Sundays & Holidays

Cement & Concrete Worker - (Hired after 2/6/2016)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $36.80
Supplemental Benefit Rate per Hour: $24.20
Supplemental Note: $26.70 on Saturdays; $29.20 on Sundays & Holidays

Overtime Description
Time and one half the regular rate after 7 hour day (time and one half the regular rate after an 8 hour day when working with Dockbuilders on pile cap forms and for work below street level to the top of the foundation wall, not to exceed 2 feet or 3 feet above the sidewalk-brick shelf, when working on the foundation and structure.)

Overtime
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day before Christmas Day
1/2 day before New Year's Day

Shift Rates
On shift work extending over a twenty-four hour period, all shifts are paid at straight time.

(Cement & Concrete Workers District Council 16)

CEMENT MASON

Cement Mason

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $57.72
Supplemental Benefit Rate per Hour: $34.51
Supplemental Note: Supplemental benefit time and one half rate: $62.72; Double time rate: double the base supplemental benefit rate.

Overtime Description
Time and one-half the regular rate after an 8 hour day, double time the regular rate after 10 hours. Time and one-half the regular rate on Saturday, double time the regular rate after 10 hours. Double time the regular rate on Sunday. Four Days a week at Ten (10) hours straight time is allowed.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
Any worker who reports to work on Christmas Eve or New Year's Eve pursuant to his employer's instruction shall be entitled to three (3) hours afternoon pay without working.

Shift Rates
For off shift work, (at times other than the regular 7:00 A.M. to 3:30 P.M. work day) a cement mason shall be paid at the regular hourly rate plus a 25% per hour differential.

(Local #780) (BCA)

CORE DRILLER
Test Boring

Core Driller

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $46.25
Supplemental Benefit Rate per Hour: $33.36

Core Driller Helper

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $36.28
Supplemental Benefit Rate per Hour: $33.36

Core Driller Helper(Third year in the industry)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $32.62
Supplemental Benefit Rate per Hour: $33.36

Core Driller Helper (Second year in the industry)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $28.98
Supplemental Benefit Rate per Hour: $33.36

Core Driller Helper (First year in the industry)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.32
Supplemental Benefit Rate per Hour: $33.36

Overtime Description
Time and one half the regular rate for work on a holiday plus Holiday pay when worked.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Memorial Day
Independence Day
Labor Day
Veteran's Day
Thanksgiving Day
Christmas Day

Shift Rates
When two (2) or more shifts are employed, single time shall be paid for each shift, but those employees employed on a shift other than from 8:00 A.M. to 5:00 P.M. shall, in addition, receive two dollars ($2.00) per hour differential for each hour worked. When three (3) shifts are needed, each shift shall work seven and one-half (7 ½) hours paid for eight (8) hours of labor and be permitted one-half (½) hour for mealtime.

(Carpenters District Council)

DERRICKPERSON AND RIGGER

Derrick Person & Rigger

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $60.40
Supplemental Benefit Rate per Hour: $60.14

Derrick Person & Rigger - Site Work

Assists the Stone Mason-Setter in the setting of stone and paving stone.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.54
Supplemental Benefit Rate per Hour: $47.70

Overtime Description
The first two hours of overtime on weekdays and the first seven hours of work on Saturdays are paid at time and one half for wages and supplemental benefits. All additional overtimes is paid at double time for wages and supplemental benefits.

Overtime
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Washington's Birthday

Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.

(Local #197)

DIVER

Diver (Marine)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $75.46
Supplemental Benefit Rate per Hour: $55.84

Diver Tender (Marine)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $55.00
Supplemental Benefit Rate per Hour: $55.84

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates
When three shifts are utilized each shift shall work seven and one half-hours (7 1/2 hours) and paid for 8 hours, allowing for one half hour for lunch.

(Carpenters District Council)

DOCKBUILDER - PILE DRIVER

Dockbuilder - Pile Driver

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $60.59
Supplemental Benefit Rate per Hour: $55.84

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate and the supplemental benefits shall be paid at the straight time rate. When two (2) or more shifts of Dockbuilders are employed, single time will be paid for each shift.

(Carpenters District Council)

DRIVER: TRUCK (TEAMSTER)

Driver - Dump Truck

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $44.17
Supplemental Benefit Rate per Hour: $59.15
Supplemental Note: Over 40 hours worked: at time and one half rate - $25.50; at double time rate - $34.00

Driver - Tractor Trailer

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.32
Supplemental Benefit Rate per Hour: $56.90
Supplemental Note: Over 40 hours worked: at time and one half rate - $25.50; at double time rate - $34.00

Driver - Euclid & Turnapull Operator

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.88
Supplemental Benefit Rate per Hour: $56.90
Supplemental Note: Over 40 hours worked: at time and one half rate - $25.50; at double time rate - $34.00

Overtime Description
For Paid Holidays: Holiday pay for all holidays shall be prorated based two hours per day for each day worked in the holiday week, not to exceed 8 hours of holiday pay. For Thanksgiving week, the prorated share shall be 5 1/3 hours of holiday pay for each day worked in Thanksgiving week.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

Shift Rates
Off shift work commencing between 6:00 P.M. and 5:00 A.M. shall work eight and one half (8 1/2) hours allowing for one half hour for lunch

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Driver Redi-Mix (Sand & Gravel)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $43.29
Supplemental Benefit Rate per Hour: $50.77
Supplemental Note: Over 40 hours worked: time and one half rate $20.48; double time rate $27.30

Overtime Description
For Paid Holidays: Employees who do not work on a contractual holiday shall be compensated two (2) hours extra pay in straight time wages and benefits for every day on which the Employee does not pass up a day's work during the calendar week (Sunday through Saturday) of the holiday, up to a maximum of ten (10) hours in wages and eight (8) hours in benefit contributions for the holiday

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
Martin Luther King Jr. Day
President's Day
Columbus Day
Veteran's Day

Triple time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Christmas Day

(Local #282)

ELECTRICIAN

(Including installation of low voltage cabling carrying data, video and/or voice on building construction/alteration/renovation projects.)

Electrician "A" (Regular Day / Day Shift)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $62.00
Supplemental Benefit Rate per Hour: $62.25
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Regular Day Overtime after 7 hrs / Day Shift Overtime after 8 hrs)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $93.00
Supplemental Benefit Rate per Hour: $64.24
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Swing Shift)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $72.75
Supplemental Benefit Rate per Hour: $70.56
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Swing Shift Overtime after 7.5 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $109.13
Supplemental Benefit Rate per Hour: $72.91

*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Graveyard Shift)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $81.49
Supplemental Benefit Rate per Hour: $77.61
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Graveyard Shift Overtime after 7 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $122.24
Supplemental Benefit Rate per Hour: $80.23
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

*** Supplemental Benefit Rate per Hour Note**
In addition to the Supplemental Benefit Rates per Hour listed above, the employer must provide an additional 6.2% of taxable gross pay earned on covered work only. This additional Supplemental Benefit Rate will terminate when the employee has contributed the maximum annual Social Security tax required by law, on all work performed.

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on a holiday.
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
For multiple shifts of temporary light and/or power, the temporary light and/or power employee shall be paid for 8 hours at the straight time rate. For three or less workers performing 8 hours temporary light and/or power the supplemental benefit rate is $24.36, effective 04/13/2023 the supplemental benefit rate is $24.78 - See * Supplemental Benefit Rate per Hour Note above.

Electrician "M" (First 8 hours)

"M" rated work shall be defined as jobbing: electrical work of limited duration and scope, also consisting of repairs and/or replacement of electrical and tele-data equipment. Includes all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls and washing and cleaning of foregoing fixtures.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $32.00
Supplemental Benefit Rate per Hour: $27.20
First and Second Year "M" Wage Rate Per Hour: $27.50
First and Second Year "M" Supplemental Rate: $24.79

Electrician "M" (Overtime After First 8 hours)

"M" rated work shall be defined as jobbing: electrical work of limited duration and scope, also consisting of repairs and/or replacement of electrical and tele-data equipment. Includes all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls and washing and cleaning of foregoing fixtures.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.00
Supplemental Benefit Rate per Hour: $29.23
First and Second Year "M" Wage Rate Per Hour: $41.25
First and Second Year "M" Supplemental Rate: $26.52

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #3)

ELECTRICIAN - ALARM TECHNICIAN

(Scope of Work - Inspect, test, repair, and replace defective, malfunctioning, or broken devices, components and controls of Fire, Burglar and Security Systems)

Alarm Technician

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.40
Supplemental Benefit Rate per Hour: $21.44
Supplemental Note: $19.31 only after 8 hours worked in a day

Overtime Description

Time and one half the regular rate for work on the following holidays: Columbus Day, Veterans Day, Day after Thanksgiving.
Double time the regular rate for work on the following holidays: New Year's day, Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

Night Differential is based upon a ten percent (10%) differential between the hours of 4:00 P.M. and 12:30 A.M. and a fifteen percent (15%) differential for the hours 12:00 A.M. to 8:30 A.M.

Vacation

At least 1 year of employment.....ten (10) days
5 years or more of employment.....fifteen (15) days
10 years of employment.....twenty (20) days
Plus one Personal Day per year

Sick Days:
One day per Year. Up to 4 vacation days may be used as sick days.

(Local #3)

ELECTRICIAN-STREET LIGHTING WORKER

Electrician - Electro Pole Electrician

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $62.00
Supplemental Benefit Rate per Hour: $62.85
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician - Electro Pole Foundation Installer

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.66
Supplemental Benefit Rate per Hour: $48.72
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician - Electro Pole Maintainer

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $41.61
Supplemental Benefit Rate per Hour: $44.45
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

*** Supplemental Benefit Rate per Hour Note**
In addition to the Supplemental Benefit Rates per Hour listed above, the employer must provide an additional 6.2% of taxable gross pay earned on covered work only. This additional Supplemental Benefit Rate will terminate when the employee has contributed the maximum annual Social Security tax required by law, on all work performed.

Overtime Description

Electrician - Electro Pole Electrician: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week.
Electrician - Electro Pole Foundation Installer: Time and one half the regular rate after 8 hours within a 24 hour period and Saturday and Sunday.
Electrician - Electro Pole Maintainer: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week. Saturdays and Sundays may be used as a make-up day at straight time when a day is lost during the week to inclement weather.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day

President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #3)

ELEVATOR CONSTRUCTOR

Elevator Constructor

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate per Hour: $80.35
Supplemental Benefit Rate per Hour: $41.23

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate per Hour: $83.27
Supplemental Benefit Rate per Hour: $42.33

Overtime Description
For New Construction: work performed after an 8 hour day, Saturday, Sunday or between 4:30pm and 7:00am shall be paid at double time rate.

Existing buildings: work performed after an 8 hour day, Saturday, Sunday or between 5:30pm and 7:00 am shall be paid time and one half.

Overtime
Double time the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day

Thanksgiving Day
Day after Thanksgiving
Christmas Day

Vacation
Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 15 years of service, and 6% for employees with 5 to 15 years of service, and 4% for employees with less than 5 years of service.

(Local #1)

ELEVATOR REPAIR & MAINTENANCE

Elevator Service/Modernization Mechanic

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate per Hour: $63.16
Supplemental Benefit Rate per Hour: $41.18

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate per Hour: $65.54
Supplemental Benefit Rate per Hour: $42.28

Overtime Description
For Scheduled Service Work: Double time - work scheduled in advance by two or more workers performed on Sundays, Holidays, and between midnight and 7:00am.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

Afternoon shift - regularly hourly rate plus a (15%) fifteen percent differential. Graveyard shift - time and one half the regular rate.

Vacation

Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 15 years of service, and 6% for employees with 5 to 15 years of service, and 4% for employees with less than 5 years of service.

(Local #1)

ENGINEER

Engineer - Heavy Construction Operating Engineer I

Cherrypickers 20 tons and over and Loaders (rubber tired and/or tractor type with a manufacturer's minimum rated capacity of six cubic yards and over).

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $76.57
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $122.51

Engineer - Heavy Construction Operating Engineer II

Backhoes, Basin Machines, Groover, Mechanical Sweepers, Bobcat, Boom Truck, Barrier Transport (Barrier Mover) & machines of similar nature. Operation of Churn Drills and machines of a similar nature, Stetco Silent Hoist and machines of similar nature, Vac-Alls, Meyers Machines, John Beam and machines of a similar nature, Ross Carriers and Travel Lifts and machines of a similar nature, Bulldozers, Scrapers and Turn-a-Pulls: Tugger Hoists (Used exclusively for handling excavated material); Tractors with attachments, Hyster and Roustabout Cranes, Cherrypickers. Austin Western, Grove and machines of a similar nature, Scoopmobiles, Monorails, Conveyors, Trenchers: Loaders-Rubber Tired and Tractor: Barber Greene and Eimco Loaders and Eimco Backhoes; Mighty Midget and similar breakers and Tampers, Curb and Gutter Pavers and Motor Patrol, Motor Graders and all machines of a similar nature. Locomotives 10 Tons or under. Mini-Max, Break-Tech and machines of a similar nature; Milling machines, robotic and demolition machines and machines of a similar nature, shot blaster, skid steer machines and machines of a similar nature including bobcat, pile rig rubber-tired excavator (37,000 lbs. and under), 2 person auger.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $74.14
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $118.62

Engineer - Heavy Construction Operating Engineer III

Minor Equipment such as Tractors, Post Hole Diggers, Ditch Witch (Walk Behind), Road Finishing Machines, Rollers five tons and under, Tugger Hoists, Dual Purpose Trucks, Fork Lifts, and Dempsey Dumpers, Fireperson.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $70.09
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $112.14

Engineer - Heavy Construction Maintenance Engineer I

Installing, Repairing, Maintaining, Dismantling of all equipment including Steel Cutting, Bending and Heat Sealing Machines, Mechanical Heaters, Grout Pumps, Bentonite Pumps & Plants, Screening Machines, Fusion Coupling Machines, Tunnel Boring Machines Moles and Machines of a similar nature, Power Packs, Mechanical Hydraulic Jacks; all drill rigs including but not limited to Churn, Rotary Caisson, Raised Bore & Drills of a similar nature; Personnel, Inspection & Safety Boats or any boats used to perform functions of same, Mine Hoists, Whirlies, all Climbing Cranes, all Tower Cranes, including but not limited to Truck Mounted and Crawler Type and machines of similar nature; Maintaining Hydraulic Drills and machines of a similar nature; Well Point System-Installation and dismantling; Burning, Welding, all Pumps regardless of size and/or motor power, except River Cofferdam Pumps and Wells Point Pumps; Motorized Buggies (three or more); equipment used in the cleaning and televising of sewers, but not limited to jet-rodder/vacuum truck, vacall/vactor, closed circuit television inspection equipment; high powered water pumps, jet pumps; screed machines and concrete finishing machines of a similar nature; vermeers.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $73.76
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $118.02

Engineer - Heavy Construction Maintenance Engineer II

On Base Mounted Tower Cranes

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $98.47
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $157.55

Engineer - Heavy Construction Maintenance Engineer III

On Generators, Light Towers

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $46.95
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $75.12

Engineer - Heavy Construction Maintenance Engineer IV

On Pumps and Mixers including mud sucking

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.29
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $77.26

Engineer - Heavy Construction Service Engineer

Gradalls: Concrete Pumps: Power Houses: Driving Truck Cranes: Driving and Operating Fuel and Grease Trucks.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $65.99
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $105.58

Engineer - Heavy Construction Service Mechanic

Shovels: Cranes: Draglines: Backhoes: Keystones: Pavers: Trenching Machines: Gunite Machines: Compressors (three (3) or more in Battery): Crawler Cranes- having a straight lattice boom with no attachment or luffing boom, no jib and no auxiliary attachment.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $44.09
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $70.54

Engineer - Steel Erection Maintenance Engineers

Derrick, Travelers, Tower, Crawler Tower and Climbing Cranes

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $70.95
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $113.52

Engineer - Steel Erection Oiler I

On a Truck Crane

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $66.10
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $105.76

Engineer - Steel Erection Oiler II

On a Crawler Crane

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.74
Supplemental Benefit Rate per Hour: $48.85
Supplemental Note: $90.30 on overtime
Shift Wage Rate: $76.38

Overtime Description
On jobs of more than one shift, if the next shift employee fails to report for work through any cause over which the employer has no control, the employee on duty who works the next shift continues to work at the single time rate.

Overtime
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Engineer - Building Work Maintenance Engineers I

Installing, repairing, maintaining, dismantling (of all equipment including: Steel Cutting and Bending Machines, Mechanical Heaters, Mine Hoists, Climbing Cranes, Tower Cranes, Linden Peine, Lorain, Liebherr, Mannes, or machines of a similar nature, Well Point Systems, Deep Well Pumps, Concrete Mixers with loading Device, Concrete Plants, Motor Generators when used for temporary power and lights), skid steer machines of a similar nature including bobcat.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $62.34
Supplemental Benefit Rate per Hour: $47.94
Supplemental Note: $88.48 on overtime

Engineer - Building Work Maintenance Engineers II

On Pumps, Generators, Mixers and Heaters

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.29
Supplemental Benefit Rate per Hour: $47.94
Supplemental Note: $88.48 on overtime

Engineer - Building Work Oilers I

All gasoline, electric, diesel or air operated Gradealls: Concrete Pumps, Overhead Cranes in Power Houses: Their duties shall be to assist the Engineer in oiling, greasing and repairing of all machines; Driving Truck Cranes: Driving and Operating Fuel and Grease Trucks, Cherrypickers (hydraulic cranes) over 70,000 GVW, and machines of a similar nature.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $59.02
Supplemental Benefit Rate per Hour: $47.94
Supplemental Note: $88.48 on overtime

Engineer - Building Work Oilers II

Oilers on Crawler Cranes, Backhoes, Trenching Machines, Gunite Machines, Compressors (three or more in Battery).

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $42.55
Supplemental Benefit Rate per Hour: $47.94
Supplemental Note: $88.48 on overtime

Overtime Description
On jobs of more than one shift, if an Employee fails to report for work through any cause over which the Employer has no control, the Employee on duty will continue to work at the rate of single time.

Overtime
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day

Christmas Day

Shift Rates
When two (2) or more shifts are employed, single time will be paid for each shift.

(Local #15)

ENGINEER - CITY SURVEYOR AND CONSULTANT

Party Chief

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $44.73
Supplemental Benefit Rate per Hour: $28.36
Supplemental Note: Overtime Benefit Rate - $33.87 per hour (time & one half) $39.37 per hour (double time).

Instrument Person

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $36.30
Supplemental Benefit Rate per Hour: $28.36
Supplemental Note: Overtime Benefit Rate - $33.87 per hour (time & one half) $39.37 per hour (double time).

Rodperson

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $30.97
Supplemental Benefit Rate per Hour: $28.36
Supplemental Note: Overtime Benefit Rate - $33.87 per hour (time & one half) $39.37 per hour (double time).

Rodperson 1st Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $28.36
Supplemental Note: Overtime Benefit Rate - $33.87 per hour (time & one half) $39.37 per hour (double time).

Overtime Description
Time and one half the regular rate after an 8 hour day, Time and one half the regular rate for Saturday for the first eight hours worked, Double time the regular time rate for Saturday for work performed in excess of eight hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays
New Year's Day

Lincoln's Birthday
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (BUILDING CONSTRUCTION)

(Construction of Building Projects, Concrete Superstructures, etc.)

Field Engineer - BC Party Chief

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $68.86
Supplemental Benefit Rate per Hour: $43.03
Supplemental Note: Overtime Benefit Rate - $60.85 per hour (time & one half) $78.66 per hour (double time).

Field Engineer - BC Instrument Person

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $50.03
Supplemental Benefit Rate per Hour: $43.03
Supplemental Note: Overtime Benefit Rate - $60.85 per hour (time & one half) $78.66 per hour (double time).

Field Engineer - BC Rodperson

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $30.96
Supplemental Benefit Rate per Hour: $43.03
Supplemental Note: Overtime Benefit Rate - $60.85 per hour (time & one half) $78.66 per hour (double time).

Overtime Description

Time and one half the regular rate after a 7 hour work and time and one half the regular rate for Saturday for the first seven hours worked, Double time the regular time rate for Saturday for work performed in excess of seven hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays

New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (HEAVY CONSTRUCTION)

(Construction of Roads, Tunnels, Bridges, Sewers, Building Foundations, Engineering Structures etc.)

Field Engineer - HC Party Chief

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $79.02
Supplemental Benefit Rate per Hour: $46.67
Supplemental Note: Overtime benefit rate - $66.19 per hour (time & one half), $85.70 per hour (double time).

Field Engineer - HC Instrument Person

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $56.62
Supplemental Benefit Rate per Hour: $46.67
Supplemental Note: Overtime benefit rate - $66.19 per hour (time & one half), $85.70 per hour (double time).

Field Engineer - HC Rodperson

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $46.66
Supplemental Benefit Rate per Hour: $46.67
Supplemental Note: Overtime benefit rate - $66.19 per hour (time & one half), $85.70 per hour (double time).

Field Engineer - HC Rodperson 1st Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $46.67

Supplemental Note: Overtime benefit rate - $66.19 per hour (time & one half), $85.70 per hour (double time).

Overtime Description

Time and one half the regular rate after an 8 hour day, Time and one half the regular rate for Saturday for the first eight hours worked, Double time the regular time rate for Saturday for work performed in excess of eight hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (STEEL ERECTION)

Field Engineer - Steel Erection Party Chief

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $74.95
Supplemental Benefit Rate per Hour: $45.01
Supplemental Note: Overtime benefit rate - $63.69 per hour (time & one half), $82.37 per hour (double time).

Field Engineer - Steel Erection Instrument Person

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $56.03
Supplemental Benefit Rate per Hour: $45.01
Supplemental Note: Overtime benefit rate - $63.69 per hour (time & one half), $82.37 per hour (double time).

Field Engineer - Steel Erection Rodperson

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $36.15
Supplemental Benefit Rate per Hour: $45.01
Supplemental Note: Overtime benefit rate - $63.69 per hour (time & one half), $82.37 per hour (double time).

Field Engineer - Steel Erection Rodperson 1st Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $45.01
Supplemental Note: Overtime benefit rate - $63.69 per hour (time & one half), $82.37 per hour (double time).

Overtime Description
Time and one half the regular rate for Saturday for the first eight hours worked.
Double time the regular rate for Saturday for work performed in excess of eight hours.

Overtime
Time and one half the regular rate after an 8 hour day.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Lincoln's Birthday
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - OPERATING

Operating Engineer - Road & Heavy Construction I

Back Filling Machines, Cranes, Mucking Machines and Dual Drum Paver.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $92.72
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $148.35

Operating Engineer - Road & Heavy Construction II

Backhoes, Power Shovels, Hydraulic Clam Shells, Steel Erection, Moles and machines of a similar nature.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $95.96
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $153.54

Operating Engineer - Road & Heavy Construction III

Mine Hoists (Cranes, etc. when used as Mine Hoists)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $99.01
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $158.42

Operating Engineer - Road & Heavy Construction IV

Gradealls, Keystones, Cranes on land or water (with digging buckets), Bridge Cranes, Vermeer Cutter and machines of a similar nature, Trenching Machines.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $96.64
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $154.62

Operating Engineer - Road & Heavy Construction V

Pile Drivers & Rigs (working alongside Dock Builder foreperson): Derrick Boats, Tunnel Shovels.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $94.76
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $151.62

Operating Engineer - Road & Heavy Construction VI

Mixers (Concrete with loading attachment), Concrete Pavers, Cableways, Land Derricks, Power Houses (Low Air Pressure Units).

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $90.08
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $144.13

Operating Engineer - Road & Heavy Construction VII

Barrier Movers, Barrier Transport and Machines of a Similar Nature.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $73.00
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $116.80

Operating Engineer - Road & Heavy Construction VIII

Utility Compressors

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $56.95
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $71.45

Operating Engineer - Road & Heavy Construction IX

Horizontal Boring Rig

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $85.75
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $137.20

Operating Engineer - Road & Heavy Construction X

Elevators (manually operated as personnel hoist).

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $78.92
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $126.27

Operating Engineer - Road & Heavy Construction XI

Compressors (Portable 3 or more in battery), Driving of Truck Mounted Compressors, Well-point Pumps, Tugger Machines Well Point Pumps, Churn Drill.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $61.57
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $98.51

Operating Engineer - Road & Heavy Construction XII

All Drills and Machines of a similar nature.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $91.03
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $145.65

Operating Engineer - Road & Heavy Construction XIII

Concrete Pumps, Concrete Plant, Stone Crushers, Double Drum Hoist, Power Houses (other than above).

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $88.22
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $141.15

Operating Engineer - Road & Heavy Construction XIV

Concrete Mixer

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $84.38
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $135.01

Operating Engineer - Road & Heavy Construction XV

Compressors (Portable Single or two in Battery, not over 100 feet apart), Pumps (River Cofferdam) and Welding Machines, Push Button Machines, All Engines Irrespective of Power (Power-Pac) used to drive auxiliary equipment, Air, Hydraulic, etc.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $57.32
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $91.71

Operating Engineer - Road & Heavy Construction XVI

Concrete Breaking Machines, Hoists (Single Drum), Load Masters, Locomotives (over ten tons) and Dinkies over ten tons, Hydraulic Crane-Second Engineer.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $80.64
Supplemental Benefit Rate per Hour: $36.90

Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $129.02

Operating Engineer - Road & Heavy Construction XVII

On-Site concrete plant engineer, On-site Asphalt Plant Engineer, and Vibratory console.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $81.22
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $129.95

Operating Engineer - Road & Heavy Construction XVIII

Tower Crane

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $116.04
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $185.66

Operating Engineer - Paving I

Asphalt Spreaders, Autogrades (C.M.I.), Roto/Mil

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $90.08
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $144.13

Operating Engineer - Paving II

Asphalt Roller

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $87.81
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $140.50

Operating Engineer - Paving III

Asphalt Plants

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $74.42

Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $119.07

Operating Engineer - Concrete I

Cranes

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $96.22
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Concrete II

Compressors

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $57.75
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Concrete III

Micro-traps (Negative Air Machines), Vac-All Remediation System.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $77.14
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Steel Erection I

Three Drum Derricks

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $100.14
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $160.22

Operating Engineer - Steel Erection II

Cranes, 2 Drum Derricks, Hydraulic Cranes, Fork Lifts and Boom Trucks.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $96.26
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $154.02

Operating Engineer - Steel Erection III

Compressors, Welding Machines.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $56.34
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $90.14

Operating Engineer - Steel Erection IV

Compressors - Not Combined with Welding Machine. (Public Works Only)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $53.69
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
Shift Wage Rate: $85.90

Operating Engineer - Building Work I

Forklifts, Plaster (Platform machine), Plaster Bucket, Concrete Pump and all other equipment used for hoisting material.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $73.52
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Building Work II

Compressors, Welding Machines (Cutting Concrete-Tank Work), Paint Spraying, Sandblasting, Pumps (with the exclusion of Concrete Pumps), All Engines irrespective of Power (Power-Pac) used to drive Auxiliary Equipment, Air, Hydraulic, Jacking System, etc.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $55.18
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Building Work III

Double Drum

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $91.26
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Building Work IV

Stone Derrick, Cranes, Hydraulic Cranes Boom Trucks.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $96.60
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Building Work V

Dismantling and Erection of Cranes, Relief Engineer.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $81.62
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Building Work VI

4 Pole Hoist, Single Drum Hoists.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $80.76
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours

Operating Engineer - Building Work VII

Rack & Pinion and House Cars

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $64.33
Supplemental Benefit Rate per Hour: $36.90
Supplemental Note: $67.50 overtime hours
For New House Car projects Wage Rate per Hour $51.45
For New House Car projects: Supplemental Benefit overtime hours: $52.20

Overtime Description

On jobs of more than one shift, if an Employee fails to report for work through any cause over which the Employer has no control, the Employee on duty will continue to work at the rate of single time.

For House Cars and Rack & Pinion only: Overtime paid at time and one-half for all hours in excess of eight hours in a day, Saturday, Sunday and Holidays worked.

Overtime

Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

When two (2) or more shifts are employed, single time will be paid for each shift.
For Steel Erection Only: Shifts may be worked at the single time rate at other than the regular working hours (8:00 A.M. to 4:30 P.M.) on the following work ONLY: Heavy construction jobs on work below the street level, over railroad tracks and on building jobs.

(Operating Engineer Local #14)

FLAGGER

Flagger to be paid at the rate of the journeyperson or apprentice in the trade performing the underlying work.

In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, this title includes traffic control duty only for City public works contracts and subcontracts solicited on or after July 1, 2024.

On City public works contracts and subcontracts solicited on or after July 1, 2024, traffic control worker to be paid at the rate of the journeyperson or apprentice in the trade performing the underlying work.

If the trade performing the underlying work does not regularly employ a flagger or traffic control worker, then one of the following titles must be used on such projects:
Laborer - Heavy & Highway
Laborer - Paver & Roadbuilder
Laborer - Paver & Roadbuilder Line Striping (Roadway)

FLOOR COVERER

(Interior vinyl composition tile, sheath vinyl linoleum and wood parquet tile including site preparation and synthetic turf not including site preparation)

Floor Coverer

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $55.05
Supplemental Benefit Rate per Hour: $47.88

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Day before Christmas
Christmas Day
Day before New Year's Day

Shift Rates

Two shifts may be utilized with the first shift working 8 a.m. to the end of the shift at straight time rate of pay. The wage rate for the second shift consisting of 7 hours shall be paid at 114.29% of straight time wage rate. The wage rate for the second shift consisting of 8 hours shall be paid 112.5% of the straight time wage rate. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

GLAZIER
(New Construction, Remodeling, and Alteration)

Glazier

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $49.00
Supplemental Benefit Rate per Hour: $55.77

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #1281)

GLAZIER - REPAIR & MAINTENANCE
(For the Installation of Glass - All repair and maintenance work on a particular building.)

Craft Jurisdiction for repair, maintenance and fabrication

Plate glass replacement, Storm windows and storm doors, Herculite door repairs, Door closer repairs, Glass tinting.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.45
Supplemental Benefit Rate per Hour: $27.93

Overtime
Time and one half the regular rate after an 8 hour day.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Local #1281)

HAZARDOUS MATERIAL HANDLER
(Removal, abatement, encapsulation or decontamination of asbestos, lead, mold, or other toxic or hazardous waste/materials)

Handler

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $39.00
Supplemental Benefit Rate per Hour: $21.65

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Sunday.
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day
Easter

Paid Holidays
None

(Local #78 and Local #12A)

HEAT AND FROST INSULATOR

Heat & Frost Insulator

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $70.96
Supplemental Benefit Rate per Hour: $36.06

Overtime Description
Supplemental Benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Triple time the regular rate for work on the following holiday(s).
Labor Day

Paid Holidays
None

Shift Rates
The first shift shall work seven hours at the regular straight time rate. The second and third shift shall work seven hours the regular straight time hourly rate plus a fourteen percent wage and benefit premium. There must be a first shift to work the second shift, and a second shift to work the third shift. Off-hour jobs in occupied buildings may be worked on weekdays with an increment of one-dollar ($1.00) per hour and eight (8) hours pay for seven (7) hours worked.

(Local #12) (BCA)

HOUSE WRECKER
(TOTAL DEMOLITION)

House Wrecker - Tier A

On all work sites the first, second, eleventh and every third House Wrecker thereafter will be Tier A House Wreckers (i.e. 1st, 2nd, 11th, 14th etc). Other House Wreckers may be Tier B House Wreckers.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $39.48
Supplemental Benefit Rate per Hour: $31.92

House Wrecker - Tier B

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $28.71
Supplemental Benefit Rate per Hour: $24.33

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL

Iron Worker - Ornamental

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.65
Supplemental Benefit Rate per Hour: $65.75
Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description
Monday through Friday- the first eight hours are paid at straight time, the 9th and 10th hours are paid at time and one-half the regular rate, all additional weekday overtime is paid at double the regular rate. Saturdays- the first eight hours are paid at time and one-half the regular rate, double time thereafter. Sunday-all shifts are paid at double time. Four Days a week at Ten (10) hours straight time is allowed

Overtime
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When two or three shifts are employed on a job, Monday through Friday, each shift will be paid eight (8) hours at the straight time rate for eight (8) hours of work; at time and one-half the regular straight time rate for the first two (2) hours of overtime worked beyond eight (8) hours; and at double time for all work thereafter. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, eight (8) hours will be paid at straight time rate for seven (7) hours of work, and all overtime shall be paid at time and one-half the regular straight time rates. On Saturday, Sundays and Holidays, time and one-half the regular straight time rate shall be paid for all work up to seven (7) hours and double time shall be paid for all work thereafter.

(Local #580)

IRON WORKER - STRUCTURAL

Iron Worker - Structural

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $58.20
Supplemental Benefit Rate per Hour: $89.27
Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description
Monday through Friday- the first eight hours are paid at straight time, the 9th and 10th hours are paid at time and one-half the regular rate, all additional weekday overtime is paid at double the regular rate. Saturdays- the first eight hours are paid at time and one-half the regular rate, double time thereafter. Sunday-all shifts are paid at double time. Four Days a week at Ten (10) hours straight time is allowed.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day on Christmas Eve if work is performed in the A.M.
1/2 day on New Year's Eve if work is performed in the A.M.

Shift Rates
Monday through Friday - First Shift: First eight hours are paid at straight time, the 9th & 10th hours are paid at time and a half, double time paid thereafter. Second and third Shifts: First eight hours are paid at time and one-half, double time thereafter. Saturdays: All shifts, first eight hours paid at time and one-half, double time thereafter: Sunday all shifts are paid at double time.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday.

(Local #40 & #361)

LABORER – HEAVY & HIGHWAY

(Foundation, Concrete, Excavating, Street Pipe Layer and Common)

Laborer - Heavy & Highway

Excavation and foundation work for buildings, heavy construction, street pipe laying, engineering work, and hazardous waste removal in connection with the above work. Landscaping tasks in connection with heavy construction work, engineering work and building projects. Projects include, but are not limited to pollution plants, sewers, parks, subways, bridges, highways, etc. In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $45.00
Supplemental Benefit Rate per Hour: $54.03

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Christmas Day

Paid Holidays

Labor Day
Thanksgiving Day

Shift Rates

When two shifts are employed, single time rate shall be paid for each shift. When three shifts are found necessary, each shift shall work seven and one half hours (7 ½), but shall be paid for eight (8) hours of labor, and be permitted one half hour for lunch.

(Local #731)

LABORER - PAVER & ROADBUILDER

Laborer - Paver & Roadbuilder

Paving and road construction work, regardless of material used, including but not limited to preparation of job sites, removal of old surfaces, asphalt and/or concrete, by whatever method, including but not limited to milling; laying of concrete; laying of asphalt for temporary, patchwork, and utility paving (but not production paving); site preparation and incidental work for installation of rubberized materials and similar surfaces; installation and repair of temporary construction fencing; slurry/seal coating, paving stones, maintenance of safety surfaces; play equipment installation, and other related work. In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $45.48
Supplemental Benefit Rate per Hour: $53.55
Supplemental Note: For time and one half overtime - $58.18 For double overtime - $62.80

Paver & Roadbuilder - Formsetter

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $49.35
Supplemental Benefit Rate per Hour: $53.55
Supplemental Note: For time and one half overtime - $58.18 For double overtime - $62.80

Production Paver & Roadbuilder - Shoveler

General laborer (except removal of surfaces - see Paver and Roadbuilder-Laborer) including but not limited to tamper, AC paint and liquid tar work.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $45.48
Supplemental Benefit Rate per Hour: $53.55
Supplemental Note: For time and one half overtime - $58.18 For double overtime - $62.80

Production Paver & Roadbuilder - Raker

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $49.35
Supplemental Benefit Rate per Hour: $53.55
Supplemental Note: For time and one half overtime - $58.18 For double overtime - $62.80

Production Paver & Roadbuilder - Screed Person

(Production paving is asphalt paving when using a paving machine or on a project where a paving machine is traditionally used)

Adjustment of paving machinery on production paving jobs.

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate per Hour: $49.95
Supplemental Benefit Rate per Hour: $53.55
Supplemental Note: For time and one half overtime - $58.18 For double overtime - $62.80

Overtime Description
If an employee works New Year's Day or Christmas Day, they receive the single time rate plus 25%.

For Paid Holidays: Holiday pay for all holidays shall be prorated based two hours per day for each day worked in the holiday week, not to exceed 8 hours of holiday pay.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day

Paid Holidays
Memorial Day
Independence Day
Labor Day
Thanksgiving Day

Shift Rates
When two shifts are employed, the work period for each shift shall be a continuous eight (8) hours. When three shifts are employed, each shift will work seven and one half (7 ½) hours but will be paid for eight (8) hours at the straight time rate since only one half (1/2) hour is allowed for meal time.
When two or more shifts are employed, single time will be paid for each shift.

(Local #1010)

LABORER - PAVER & ROADBUILDER LINE STRIPING (ROADWAY)
(Painting of traffic lines on roadways)

Striping - Machine Operator

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate per Hour: $41.00
Supplemental Benefit Rate per Hour: $19.27
Supplemental Note: For time and one half overtime - $20.52 For double overtime - $21.77

Lineperson (Thermoplastic)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $45.00
Supplemental Benefit Rate per Hour: $19.27
Supplemental Note: For time and one half overtime - $20.52 For double overtime - $21.77

Laborer Striping Assistant & Traffic Safety

In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $39.00
Supplemental Benefit Rate per Hour: $19.27
Supplemental Note: For time and one half overtime - $20.52 For double overtime - $21.77

Overtime Description
For Paid Holidays: Employees will only receive Holiday Pay for holidays not worked if said employee worked both the regularly scheduled workday before and after the holiday.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

(Local #1010)

LANDSCAPING

(Landscaping tasks, such as tree pruning, tree removing and spraying in connection with Green Infrastructure maintenance and the planting of street trees and trees in City parks, but not when such activities are performed as part of construction or reconstruction projects.)

Landscaper (Year 6 and above)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.77
Supplemental Benefit Rate per Hour: $18.05

Landscaper (Year 3 - 5)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $36.56
Supplemental Benefit Rate per Hour: $18.05

Landscaper (up to 3 years)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $33.55
Supplemental Benefit Rate per Hour: $18.05

Groundperson

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $33.55
Supplemental Benefit Rate per Hour: $18.05

Tree Remover / Pruner

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $43.81
Supplemental Benefit Rate per Hour: $18.05

Landscaper Sprayer (Pesticide Applicator)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $31.75
Supplemental Benefit Rate per Hour: $18.05

Watering - Plant Maintainer

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate per Hour: **$25.69**
Supplemental Benefit Rate per Hour: **$18.05**

Overtime Description
For all overtime work performed, supplemental benefits shall include an additional seventy-five ($0.75) cents per hour.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Shift Rates
Work performed on a 4pm to 12am shift has a 15% differential. Work performed on a 12am to 8am shift has a 20% differential.

(Local #175)

MARBLE MECHANIC

Marble Setter

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$58.92**
Supplemental Benefit Rate per Hour: **$44.01**

Marble Finisher

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$45.44**
Supplemental Benefit Rate per Hour: **$41.06**

Marble Polisher

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$44.47**

Supplemental Benefit Rate per Hour: $33.96

Marble Maintenance Finisher

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.72
Supplemental Benefit Rate per Hour: $15.31

Overtime Description
Supplemental Benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #7)

MASON TENDER
Building Laborer

Mason Tender

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $41.45
Supplemental Benefit Rate per Hour: $33.24

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
The employer may work two (2) shifts with the first shift at the straight time wage rate and the second shift receiving eight (8) hours paid for seven (7) hours work at the straight time wage rate. When it is not possible to conduct alteration work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Local #79)

MASON TENDER (INTERIOR DEMOLITION WORKER)

Mason Tender Tier A

Tier A Interior Demolition Worker performs all burning, chopping, and other technically skilled tasks related to interior demolition work.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $38.00
Supplemental Benefit Rate per Hour: $26.54

Mason Tender Tier B

Tier B Interior Demolition Worker performs manual work and work incidental to demolition work, such as loading and carting of debris from the work site to an area where it can be loaded in to bins/trucks for removal. Also performs clean-up of the site when demolition is completed.

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate per Hour: **$27.19**
Supplemental Benefit Rate per Hour: **$20.86**

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Local #79)

METALLIC LATHER

Metallic Lather

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$46.45**
Supplemental Benefit Rate per Hour: **$54.80**
Supplemental Note: For time and one half overtime - $66.55 For double overtime - $86.60

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day on Christmas Eve if work is performed in the A.M.
1/2 day on New Year's Eve if work is performed in the A.M.

Shift Rates
Off-shift work outside of normal working hours shall receive straight time rate plus $12 per hour for the first eight (8) hours.

(Local #46)

MILLWRIGHT

Millwright

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $59.35
Supplemental Benefit Rate per Hour: $58.67

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day on Christmas Eve if work is performed in the A.M.
1/2 day on New Year's Eve if work is performed in the A.M.

Shift Rates

Second and third shifts receives the straight time rate of pay plus fifteen (15%) percent allowing for one half hour for a meal. There must be a first shift to work a second and third shift. All additional hours worked shall be paid at the time and one-half rate of pay plus fifteen (15%) percent for weekday hours.

(Local #740)

MOSAIC MECHANIC

Mosaic Mechanic - Mosaic & Terrazzo Mechanic

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $53.98
Supplemental Benefit Rate per Hour: $47.12

Mosaic Mechanic - Mosaic & Terrazzo Finisher

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $52.37
Supplemental Benefit Rate per Hour: $47.12

Mosaic Mechanic - Machine Operator Grinder

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $52.37
Supplemental Benefit Rate per Hour: $47.12

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Washington's Birthday
Good Friday
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

(Local #7)

PAINTER

Painter - Brush & Roller

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $44.00
Supplemental Benefit Rate per Hour: $42.46
Supplemental Note: $50.56 on overtime

Spray & Scaffold / Decorative / Sandblast

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.00
Supplemental Benefit Rate per Hour: $42.46
Supplemental Note: $50.56 on overtime

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(District Council of Painters #9)

PAINTER - BRIDGE & STRUCTURAL STEEL

Painters on Structural Steel

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $56.00
Supplemental Benefit Rate per Hour: $52.78

Painter - Power Tool

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $63.00
Supplemental Benefit Rate per Hour: $52.78
Overtime Wage Rate: $6.50 above the "Painters on Structural Steel" overtime rate.

Overtime Description
Supplemental Benefits shall be paid for each hour worked, up to forty (40) hours per week for the period of May 1st to November 15th or up to fifty (50) hours per week for the period of November 16th to April 30th.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Second shift is paid at regular hourly wage rates plus a ten percent (10%) differential. There must be a first shift to work a second shift.

(Local #806)

PAINTER - METAL POLISHER

METAL POLISHER

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $34.00
Supplemental Benefit Rate per Hour: $12.36

METAL POLISHER - NEW CONSTRUCTION

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $34.95
Supplemental Benefit Rate per Hour: $12.36

METAL POLISHER - SCAFFOLD OVER 34 FEET

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.50
Supplemental Benefit Rate per Hour: $12.36

ASSISTANT METAL POLISHER

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $26.50
Supplemental Benefit Rate per Hour: $11.92

ASSISTANT METAL POLISHER - NEW CONSTRUCTION

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.25
Supplemental Benefit Rate per Hour: $11.92

ASSISTANT METAL POLISHER - SCAFFOLD OVER 34 FEET

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $29.00
Supplemental Benefit Rate per Hour: $11.92

Overtime Description

All work performed on Saturdays shall be paid at time-in-a half. The exception being; for suspended scaffold work and work deemed as a construction project; an eight (8) hour shift lost during the week due to circumstances beyond the control of the employer, up to a maximum of eight (8) hours per week, may be worked on Saturday at the straight time rate.

Holiday Pay
Double time the regular rate for work on the following Holiday plus the day's pay. Only employees who have completed one year of service, including any trial period shall be eligible for holiday pay.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
Four Days a week at Ten (10) hours straight a day.

Local 8A-28A

PAINTER - SIGN

Sign Painter

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.07
Supplemental Benefit Rate per Hour: $27.25

Assistant Sign Painter

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $40.85
Supplemental Benefit Rate per Hour: $25.90

Overtime Description
If any employee is required to work on any of the paid holidays then the employee shall receive double time rate of wages as well as the holiday pay for that day.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

Paid Holidays
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Vacation
At least 1 year of employment.....1 week
2 years or more of employment.....2 weeks
8 years or more of employment.....3 weeks

(Local #8A-28A)

PAPERHANGER

Paperhanger

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.02
Supplemental Benefit Rate per Hour: $43.14
Supplemental Note: Supplemental benefits are to be paid at the appropriate straight time and overtime rate.

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double Time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
Evening shift - 4:30 P.M. to 12:00 Midnight (regular rate of pay); any work performed before 7:00 A.M. shall be at time and one half the regular base rate of pay.

(District Council of Painters #9)

PAVER AND ROADBUILDER
SEE LABORER - PAVER AND ROADBUILDER

PAVER AND ROADBUILDER - LINE STRIPING (ROADWAY)
SEE LABORER - PAVER AND ROADBUILDER - LINE STRIPING (ROADWAY)

PLASTERER

Plasterer

Effective Period: 7/1/2024 - 7/31/2024
Wage Rate per Hour: $52.10
Supplemental Benefit Rate per Hour: $25.35

Effective Period: 8/1/2024 - 6/30/2025
Wage Rate per Hour: $52.99
Supplemental Benefit Rate per Hour: $26.10

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When it is not possible to conduct work during regular working hours (between 6:30am and 4:30pm), a shift differential shall be paid at the regular hourly rate plus a twelve percent (12%) per hour differential. Workers on shift work shall be allowed a paid one-half hour meal break.

(Local #262)

PLASTERER - TENDER

Plasterer - Tender

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $41.45
Supplemental Benefit Rate per Hour: $33.24

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When work commences outside regular work hours, workers receive an hour additional (differential) wage and supplement payment. Eight hours pay for seven hours work or nine hours pay for eight hours work.

(Mason Tenders District Council)

PLUMBER

Plumber

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $74.95
Supplemental Benefit Rate per Hour: $43.00
Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Plumber - Temporary Services

Temporary Services - When there are no Plumbers on the job site, there may be three shifts designed to cover the entire twenty-four hour period, including weekends if necessary, at the following rate straight time.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $60.04
Supplemental Benefit Rate per Hour: $34.32

Overtime Description
Where the plumbing contract price is one and one half million dollars ($1,500,000.00) or less, double time the regular rate after an 8 hour day.

Overtime
Double time the regular rate after a 7 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day

Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
30% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shifts Monday to Friday. 50% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shift work performed on weekends. For shift work on holidays, double time wages and fringe benefits shall be paid.

(Plumbers Local #1)

PLUMBER (MECHNICAL EQUIPMENT AND SERVICE)
(Mechanical Equipment and Service work shall include any repair and/or replacement of the present plumbing system.)

Plumber

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.20
Supplemental Benefit Rate per Hour: $21.36

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Plumbers Local # 1)

PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $52.07
Supplemental Benefit Rate per Hour: $30.82

Overtime
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
30% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shifts Monday to Friday. 50% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shift work performed on weekends. For shift work on holidays, double time wages and fringe benefits shall be paid.

(Plumbers Local #1)

PLUMBER: PUMP & TANK
Oil Trades (Installation and Maintenance)

Plumber - Pump & Tank

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $73.00

Supplemental Benefit Rate per Hour: $32.81

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
All work outside the regular workday (8:00 A.M. to 3:30 P.M.) is to be paid at time and one half the regular hourly rate

(Plumbers Local #1)

POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER
(Exterior Building Renovation)

Journeyperson

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $63.43
Supplemental Benefit Rate per Hour: $31.50

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
All work outside the regular work day (an eight hour workday between the hours of 6:00 A.M. and 4:00 P.M.) is to be paid at time and one half the regular rate. However, the employer may establish one (1) or two (2) shifts starting at or after 4:00 P.M. to be paid at the regular hourly rate plus a 10% differential. For projects bid and performed after July 1, 2023, the first shift shall be paid at the regular hourly rate plus a 5% differential.

(Bricklayer District Council)

ROOFER

Roofer

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.50
Supplemental Benefit Rate per Hour: $38.81

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Second shift - Regular hourly rate plus a 10% differential. Third shift - Regular hourly rate plus a 15% differential. There must be a first shift to work the second shift, and a second shift to work the third shift. All other work outside the regular work day (an eight hour workday between the hours of 5:00 A.M. and 4:00 P.M.) is to be paid at time and one half the regular rate.

(Local #8)

SHEET METAL WORKER

Sheet Metal Worker

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $53.60
Supplemental Benefit Rate per Hour: $58.43
Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Sheet Metal Worker - Fan Maintenance

(The temporary operation of fans or blowers in new or existing buildings for heating and/or ventilation, and/or air conditioning prior to the completion of the project.)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $42.88
Supplemental Benefit Rate per Hour: $58.43

Sheet Metal Worker - Duct Cleaner

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $19.57
Supplemental Benefit Rate per Hour: $12.72

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day

President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
Work that can only be performed outside regular working hours (eight hours of work between 7:30 A.M. and 3:30 P.M.) - First shift (work between 3:30 P.M. and 11:30 P.M.) - 10% differential above the established hourly rate. Second shift (work between 11:30 P.M. and 7:30 A.M.) - 15% differential above the established hourly rate.

For Fan Maintenance: On all full shifts of fan maintenance work the straight time hourly rate of pay will be paid for each shift, including nights, Saturdays, Sundays, and holidays.

(Local #28)

SHEET METAL WORKER - SPECIALTY
(Decking & Siding)

Sheet Metal Specialty Worker

The first worker to perform this work must be paid at the rate of the Sheet Metal Worker. The second and third workers shall be paid the Specialty Worker Rate. The ratio of One Sheet Metal Worker, then Two Specialty Workers shall be utilized thereafter.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $50.10
Supplemental Benefit Rate per Hour: $30.04
Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day

Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Local #28)

SHIPYARD WORKER

Shipyard Mechanic - First Class

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $31.50
Supplemental Benefit Rate per Hour: $3.98

Shipyard Mechanic - Second Class

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.86
Supplemental Benefit Rate per Hour: $3.77

Shipyard Laborer - First Class

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.85
Supplemental Benefit Rate per Hour: $3.78

Shipyard Laborer - Second Class

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $18.87
Supplemental Benefit Rate per Hour: $3.72

Shipyard Dockhand - First Class

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.20

Supplemental Benefit Rate per Hour: $3.77

Shipyard Dockhand - Second Class

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $19.37
Supplemental Benefit Rate per Hour: $3.63

Overtime Description
Work performed on holiday is paid double time the regular hourly wage rate plus holiday pay.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Based on Survey Data

SIGN ERECTOR
(Sheet Metal, Plastic, Electric, and Neon)

Sign Erector

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $58.00
Supplemental Benefit Rate per Hour: $63.44

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Time and one half the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
Time and one half the regular hourly rate is to be paid for all hours worked outside the regular workday either (7:00 A.M. through 2:30 P.M.) or (8:00 A.M. through 3:30 P.M.)

(Local #137)

STEAMFITTER

Steamfitter

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $61.80
Supplemental Benefit Rate per Hour: $61.14
Supplemental Note: Overtime supplemental benefit rate: $121.54

Steamfitter -Temporary Services

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $46.97
Supplemental Benefit Rate per Hour: $49.65

Overtime Description
Double time after a 7 hour day except for Temporary Services.

Overtime
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day

President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
May be performed outside of the regular workday except Saturday, Sunday and Holidays. When shift work is performed the wage rate for regular time worked is a 15% percent premium on wage and 15% percent premium on supplemental benefits.

Local 638

STEAMFITTER - REFRIGERATION AND AIR CONDITIONER
(Maintenance and Installation Service Person)

Refrigeration and Air Conditioner Mechanic

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $46.10
Supplemental Benefit Rate per Hour: $21.96

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Independence Day
Labor Day
Veteran's Day
Thanksgiving Day
Christmas Day

Double time and one half the regular rate for work on the following holiday(s).
Martin Luther King Jr. Day
President's Day
Memorial Day
Columbus Day

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

(Local #638-B)

STONE MASON - SETTER

Stone Mason - Setter

(Assisted by Derrickperson and Rigger)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $57.35
Supplemental Benefit Rate per Hour: $55.47

Overtime

Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Washington's Birthday
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.

Shift Rates
For all work outside the regular workday (8:00 A.M. to 3:30 P.M. Monday through Friday), the pay shall be straight time plus a ten percent (10%) differential.

(Bricklayers District Council)

TAPER

Drywall Taper

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.47
Supplemental Benefit Rate per Hour: $33.51

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Columbus Day
Thanksgiving Day
Day before Christmas
Christmas Day
Day before New Year's Day

Paid Holidays
Labor Day

(Local #1974)

TELECOMMUNICATION WORKER

(Install/maintain/repair telecommunications cables carrying data, video, and/or voice except for installation on building construction/alteration/renovation projects.)

Telecommunication Worker

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $47.03
Supplemental Benefit Rate per Hour: $23.15
Supplemental Note: The above rate applies for Manhattan, Bronx, Brooklyn, Queens. $22.84 for Staten Island only.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays

New Year's Day
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day
Employees have the option of observing either Martin Luther King's Birthday or the day after Thanksgiving instead of Lincoln's Birthday

Shift Rates

For any workday that starts before 8A.M. or ends after 6P.M. there is a 10% differential for the applicable worker's hourly rate.

Vacation

After 6 months.....one week.
After 12 months but less than 7 years.....two weeks.
After 7 or more but less than 15 years.....three weeks.
After 15 years or more but less than 25 years.....four weeks.

(C.W.A.)

TILE FINISHER

Tile Finisher

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $49.46
Supplemental Benefit Rate per Hour: $32.86

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

Shift Rates

Off shift work day (work performed outside the regular 8:00 A.M. to 3:30 P.M. workday): shift differential of one and one quarter (1¼) times the regular straight time rate of pay for the seven hours of actual off-shift work.

(Local #7)

TILE LAYER - SETTER

Tile Layer - Setter

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $64.40
Supplemental Benefit Rate per Hour: $36.01

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
Off shift work day (work performed outside the regular 8:00 A.M. to 3:30 P.M. workday): shift differential of one and one quarter (1¼) times the regular straight time rate of pay for the seven hours of actual off-shift work.

(Local #7)

TIMBERPERSON

Timberperson

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $55.59
Supplemental Benefit Rate per Hour: $55.41

Overtime
Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate. Benefits for off-shift work shall be paid at the straight time rate.

(Local #1556)

TUNNEL WORKER

Blasters, Mucking Machine Operators (Compressed Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $73.50
Supplemental Benefit Rate per Hour: $64.93

Tunnel Workers (Compressed Air Rates)

Includes shield driven liner plate portions or solidification portions work (8 hour shift) during excavation phase.

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $70.88
Supplemental Benefit Rate per Hour: $62.88

Top Nipper (Compressed Air Rates)

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate per Hour: **$69.69**
Supplemental Benefit Rate per Hour: **$61.64**

Outside Lock Tender, Outside Gauge Tender,Muck Lock Tender (Compressed Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$68.30**
Supplemental Benefit Rate per Hour: **$60.64**

Bottom Bell & Top Bell Signal Person: Shaft Person (Compressed Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$68.30**
Supplemental Benefit Rate per Hour: **$60.64**

Changehouse Attendant: Powder Watchperson (Compressed Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$60.18**
Supplemental Benefit Rate per Hour: **$56.85**

Blasters (Free Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$70.12**
Supplemental Benefit Rate per Hour: **$62.33**

Tunnel Workers (Free Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$67.08**
Supplemental Benefit Rate per Hour: **$59.73**

All Others (Free Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$62.01**
Supplemental Benefit Rate per Hour: **$55.28**

Microtunneling (Free Air Rates)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: **$53.66**
Supplemental Benefit Rate per Hour: **$47.78**

Overtime Description

For work performed during excavation and primary concrete tunnel lining phases - Double time the regular rate after an 8 hour day and Saturday, Sunday and on the following holiday(s) listed below.
For Repair-Maintenance Work on Existing Equipment and Facilities - Time and one half the regular rate after a 8 hour day, Saturday, Sunday and double time the regular rate for work on the following holiday(s) listed below.
For Small-Bore Micro Tunneling Machines - Time and one-half the regular rate shall be paid for all overtime.
For work not listed above - Time and one half the regular rate after an 8 hour day and Saturday and double time the regular rate on Sunday and on the following holiday(s) listed below.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

(Local #147)

UTILITY LOCATOR

(Locate & mark underground utilities including gas for street excavation and utility line repairs)

Utility Locator (Year 7 and above)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $31.56
Supplemental Benefit Rate per Hour: $1.43

Effective Period: 8/26/2024 – 6/30/2025
Wage Rate per Hour: $35.50
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 5 Second 6 months & Year 6)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $22.85
Supplemental Benefit Rate per Hour: $1.43

Effective Period: 8/26/2024 – 6/30/2025
Wage Rate per Hour: $35.50

Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 5 fist 6 months)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $22.85
Supplemental Benefit Rate per Hour: $1.43

Effective Period: 8/26/2024 - 6/30/2025
Wage Rate per Hour: $34.80
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 4)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $21.54
Supplemental Benefit Rate per Hour: $1.43

Effective Period: 8/26/2024 - 6/30/2025
Wage Rate per Hour: $31.54
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 3)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $20.30
Supplemental Benefit Rate per Hour: $1.43

Effective Period: 8/26/2024 - 6/30/2025
Wage Rate per Hour: $28.28
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 2)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $19.13
Supplemental Benefit Rate per Hour: $1.43

Effective Period: 8/26/2024 - 6/30/2025
Wage Rate per Hour: $25.02
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 1)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $18.04
Supplemental Benefit Rate per Hour: $1.43

Effective Period: 8/26/2024 - 6/30/2025
Wage Rate per Hour: $21.76

Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Up to 1 year)

Effective Period: 7/1/2024 - 8/25/2024
Wage Rate per Hour: $17.00
Supplemental Benefit Rate per Hour: $1.43
Supplemental Note: No benefits for the first 90 days of employment.

Effective Period: 8/26/2024 - 6/30/2025
Wage Rate per Hour: $18.50
Supplemental Benefit Rate per Hour: $1.43
Supplemental Note: No benefits for the first 90 days of employment.

Overtime
Time and one half the regular rate for work on the following holiday(s).
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays
New Year's Day
Memorial Day
Independence Day
Thanksgiving Day
Christmas Day

Shift Rates
10% shift differential to employees working any shift starting between noon and 5 AM.

Vacation
For up to 1 year 0 hours
For year 1 - 2 48 hours per year
For year 3 - 9 96 hours per year
For year 10 or more 144 hours per year

Sick Days:
For up to 1 year employee receives 40 hours paid sick leave.
For year 1 employee earns 2 hours of paid sick leave for every 100 overtime hours worked.
For year 2 - 9 years employee earns 4 hours of paid sick leave for every 100 overtime hours worked.
For year 10 or more employee earns 6 hours of paid sick leave for every 100 overtime hours worked.

(C.W.A.)

WELDER

WELDER AND FIREWATCH TO BE PAID AT THE RATE OF THE JOURNEYPERSON OR REGISTERED APPRENTICE IN THE TRADE PERFORMING THE WORK.

OFFICE OF THE COMPTROLLER

CITY OF NEW YORK

CONSTRUCTION APPRENTICE PREVAILING WAGE SCHEDULE

Pursuant to Labor Law § 220 (3-e), only apprentices who are individually registered in a bona fide program to which the employer contractor is a participant and registered with the New York State Department of Labor, may be paid at the apprentice rates in this schedule. Apprentices who are not so registered must be paid as journey persons in accordance with the trade classification of the work they actually performed.

Apprentice ratios are established to ensure the proper safety, training and supervision of apprentices. A ratio establishes the number of journey workers required for each apprentice in a program and on a job site. Ratios are interpreted as follows: in the case of a 1:1, 1:4 ratio, there must be one journey worker for the first apprentice, and four additional journey workers for each subsequent apprentice.

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BOILERMAKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Boilermaker (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $34.95

Boilermaker (Second Year: 1st Six Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $36.99

Boilermaker (Second Year: 2nd Six Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $39.06

Boilermaker (Third Year: 1st Six Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $41.09

Boilermaker (Third Year: 2nd Six Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 85% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $43.17

Boilermaker (Fourth Year: 1st Six Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $45.23

Boilermaker (Fourth Year: 2nd Six Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $47.28

(Local #5)

BRICKLAYER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Bricklayer (First 750 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $27.60

Bricklayer (Second 750 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $27.60

Bricklayer (Third 750 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $27.60

Bricklayer (Fourth 750 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $27.60

Bricklayer (Fifth 750 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $27.60

Bricklayer (Sixth 750 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $27.60

(Bricklayer District Council)

CARPENTER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Carpenter (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour For Building Apprentice: $22.20
Supplemental Benefit Rate Per Hour For Building Apprentice: $17.70

Wage Rate Per Hour For Heavy Apprentice: $26.98
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $37.89

Carpenter (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour For Building Apprentice: $25.20
Supplemental Benefit Rate Per Hour For Building Apprentice: $19.20

Wage Rate Per Hour For Heavy Apprentice: $32.58
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $37.89

Carpenter (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour For Building Apprentice: $29.45
Supplemental Benefit Rate Per Hour For Building Apprentice: $22.80

Wage Rate Per Hour For Heavy Apprentice: $40.96
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $37.89

Carpenter (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour For Building Apprentice: $37.33
Supplemental Benefit Rate Per Hour For Building Apprentice: $24.80

Wage Rate Per Hour For Heavy Apprentice: $49.35
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $37.89

(Carpenters District Council)

CARPENTER - HIGH RISE CONCRETE FORMS
(Ratio of Apprentice to Journeyperson: 1 to 1, 2 to 5)

Carpenter - High Rise (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $18.27
Supplemental Benefit Rate per Hour: $17.55

Carpenter - High Rise (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.70
Supplemental Benefit Rate per Hour: $17.68

Carpenter - High Rise (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $31.28
Supplemental Benefit Rate per Hour: $17.81

Carpenter - High Rise (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $38.90
Supplemental Benefit Rate per Hour: $17.96

(Carpenters District Council)

CEMENT AND CONCRETE WORKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Cement & Concrete Worker (First 1333 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 53% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $16.44

Cement & Concrete Worker (Second 1333 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 69% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $21.72

Cement & Concrete Worker (Last 1334 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 85% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $23.00

(Cement Concrete Workers District Council)

CEMENT MASON

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cement Mason (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.39
Supplemental Benefit Rate per Hour: $14.86

Cement Mason (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $28.29
Supplemental Benefit Rate per Hour: $15.16

Cement Mason (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $33.69
Supplemental Benefit Rate per Hour: $15.27

(Local #780)

DERRICKPERSON & RIGGER (STONE)

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Derrickperson & Rigger (stone) - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: 50% of Journeyperson's rate

Derrickperson & Rigger (stone) - Second Year: 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyperson's rate

Derrickperson & Rigger (stone) - Second Year: 2nd Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyperson's rate

Derrickperson & Rigger (stone) - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyperson's rate

(Local #197)

DOCKBUILDER/PILE DRIVER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Dockbuilder/Pile Driver (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: $26.98
Supplemental Benefit Rate Per Hour: $37.89

Dockbuilder/Pile Driver (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: $32.58
Supplemental Benefit Rate Per Hour: $37.89

Dockbuilder/Pile Driver (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: $40.96
Supplemental Benefit Rate Per Hour: $37.89

Dockbuilder/Pile Driver (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: $49.35
Supplemental Benefit Rate Per Hour: $37.89

(Carpenters District Council)

ELECTRICIAN

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Electrician (First Term: 0-6 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $18.00
Supplemental Benefit Rate per Hour: $17.18
Overtime Supplemental Rate Per Hour: $18.38

Electrician (First Term: 7-12 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $18.50
Supplemental Benefit Rate per Hour: $17.44
Overtime Supplemental Rate Per Hour: $18.67

Electrician (Second Term: 0-6 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $19.50
Supplemental Benefit Rate per Hour: $17.97
Overtime Supplemental Rate Per Hour: $19.26

Electrician (Second Term: 7-12 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $20.50
Supplemental Benefit Rate per Hour: $18.49
Overtime Supplemental Rate Per Hour: $19.85

Electrician (Third Term: 0-6 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.50

Supplemental Benefit Rate per Hour: $19.02
Overtime Supplemental Rate Per Hour: $20.44

Electrician (Third Term: 7-12 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $22.50
Supplemental Benefit Rate per Hour: $19.54
Overtime Supplemental Rate Per Hour: $21.03

Electrician (Fourth Term: 0-6 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.50
Supplemental Benefit Rate per Hour: $20.06
Overtime Supplemental Rate Per Hour: $21.62

Electrician (Fourth Term: 7-12 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.50
Supplemental Benefit Rate per Hour: $21.11
Overtime Supplemental Rate Per Hour: $22.80

Electrician (Fifth Term: 0-12 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $24.79
Overtime Supplemental Rate Per Hour: $26.52

Electrician (Fifth Term: 13-18 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $32.00
Supplemental Benefit Rate per Hour: $27.20
Overtime Supplemental Rate Per Hour: $29.23

Overtime Description

Overtime Wage paid at time and one half the regular rate

(Local #3)

ELEVATOR CONSTRUCTOR

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator (Constructor) - First Year

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $34.78

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $35.48

Elevator (Constructor) - Second Year

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $35.42

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $36.16

Elevator (Constructor) - Third Year

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: $36.71

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: $37.53

Elevator (Constructor) - Fourth Year

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $38.00

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $38.90

(Local #1)

ELEVATOR REPAIR & MAINTENANCE

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator Service/Modernization Mechanic (First Year)

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: $34.75

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: $35.45

Elevator Service/Modernization Mechanic (Second Year)

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: $35.39

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: $36.13

Elevator Service/Modernization Mechanic (Third Year)

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: $36.68

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: $37.50

Elevator Service/Modernization Mechanic (Fourth Year)

Effective Period: 7/1/2024 - 3/16/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: $37.96

Effective Period: 3/17/2025 - 6/30/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: $38.86

(Local #1)

ENGINEER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Engineer - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.47
Supplemental Benefit Rate per Hour: $34.30

Engineer - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $34.34
Supplemental Benefit Rate per Hour: $34.30

Engineer - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.77
Supplemental Benefit Rate per Hour: $34.30

Engineer - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $41.21
Supplemental Benefit Rate per Hour: $34.30

(Local #15)

ENGINEER - OPERATING

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Operating Engineer - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 40% of Operating Engineer - Road & Heavy Construction V's Rate
Supplemental Benefit Per Hour: $26.40

Operating Engineer - Second Year

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate Per Hour: 50% of Operating Engineer - Road & Heavy Construction V's Rate
Supplemental Benefit Per Hour: $26.40

Operating Engineer - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 60% of Operating Engineer - Road & Heavy Construction V's Rate
Supplemental Benefit Per Hour: $26.40

(Local #14)

FLOOR COVERER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Floor Coverer (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.20
Supplemental Benefit Rate per Hour: $17.25

Floor Coverer (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $28.20
Supplemental Benefit Rate per Hour: $18.75

Floor Coverer (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $32.45
Supplemental Benefit Rate per Hour: $22.35

Floor Coverer (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $40.33
Supplemental Benefit Rate per Hour: $24.35

(Carpenters District Council)

GLAZIER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Glazier (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Glazier (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Glazier (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Glazier (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

(Local #1281)

HAZARDOUS MATERIAL HANDLER

(Ratio of Apprentice Journeyperson: 1 to 1, 1 to 3)

Handler (First 1000 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $20.00
Supplemental Benefit Rate per Hour: $15.10

Handler (Second 1000 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.00
Supplemental Benefit Rate per Hour: $15.10

Handler (Third 1000 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.00
Supplemental Benefit Rate per Hour: $15.10

Handler (Fourth 1000 Hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $26.00
Supplemental Benefit Rate per Hour: $15.10

(Local #78)

HEAT & FROST INSULATOR

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Heat & Frost Insulator (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Heat & Frost Insulator (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Heat & Frost Insulator (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Heat & Frost Insulator (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

(Local #12)

HOUSE WRECKER
(TOTAL DEMOLITION)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

House Wrecker - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.55
Supplemental Benefit Rate per Hour: $11.27

House Wrecker - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.30
Supplemental Benefit Rate per Hour: $11.27

House Wrecker - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.80
Supplemental Benefit Rate per Hour: $11.27

House Wrecker - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.30
Supplemental Benefit Rate per Hour: $11.27

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Iron Worker (Ornamental) - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.98
Supplemental Benefit Rate per Hour: $16.00

Iron Worker (Ornamental) - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $28.45
Supplemental Benefit Rate per Hour: $18.00

Iron Worker (Ornamental) - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $30.80
Supplemental Benefit Rate per Hour: $19.00

Iron Worker (Ornamental) - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $34.39
Supplemental Benefit Rate per Hour: $21.00

(Local #580)

IRON WORKER - STRUCTURAL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Iron Worker (Structural) - 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $30.23
Supplemental Benefit Rate per Hour: $61.90

Iron Worker (Structural) - 7- 18 Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $30.83
Supplemental Benefit Rate per Hour: $61.90

Iron Worker (Structural) - 19 - 36 months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $31.44
Supplemental Benefit Rate per Hour: $61.90

(Local #40 and #361)

LABORER - HEAVY & HIGHWAY

(Ratio Apprentice to Journeyperson: 1 to 1, 1 to 3)

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - First 1000 hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $54.03

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Second 1000 hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: 54.03

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Third 1000 hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: 54.03

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Fourth 1000 hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Rate Per Hour: $54.03

(Local #731)

LABORER - PAVER & ROADBUILDER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Paver and Roadbuilder - First Year (Minimum 1000 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $31.36
Supplemental Benefit Rate per Hour: $26.67

Paver and Roadbuilder - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $33.00
Supplemental Benefit Rate per Hour: $26.67

(Local#1010)

LABORER - PAVER AND ROADBUILDER - LINE STRIPING (ROADWAY)

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Paver and Roadbuilder - Line Striping (Roadway) - First Year (Minimum 1000 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $31.36
Supplemental Benefit Rate per Hour: $19.27

Paver and Roadbuilder - Line Striping (Roadway) - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $33.00
Supplemental Benefit Rate per Hour: $19.27

(Local #1010)

MARBLE MECHANICS

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cutters & Setters - First 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

NO BENEFITS PAID DURING THE FIRST TWO MONTHS (PROBATIONARY PERIOD)

Cutters & Setters - Second 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 45% of Journeyperson's rate

Cutters & Setters - Third 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Cutters & Setters - Fourth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Cutters & Setters - Fifth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Cutters & Setters - Sixth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Cutters & Setters - Seventh 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

Cutters & Setters - Eighth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Cutters & Setters - Ninth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

Cutters & Setters - Tenth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025

Wage and Supplemental Rate Per Hour: 95% of Journeyperson's rate

Polishers & Finishers - First 900 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

NO BENEFITS PAID DURING THE FIRST TWO MONTHS (PROBATIONARY PERIOD)

Polishers & Finishers - Second 900 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

Polishers & Finishers - Third 900 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 90% of Journeyperson's rate

(Local #7)

MASON TENDER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Mason Tender - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $22.05
Supplemental Benefit Rate per Hour: $10.77

Mason Tender - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.80
Supplemental Benefit Rate per Hour: $10.77

Mason Tender - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.30
Supplemental Benefit Rate per Hour: $10.77

Mason Tender - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.80
Supplemental Benefit Rate per Hour: $10.77

(Local #79)

MASON TENDER (INTERIOR DEMOLITION WORKER)

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Mason Tender (Interior Demolition) - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.30
Supplemental Benefit Rate per Hour: $10.97

Mason Tender (Interior Demolition) - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.05
Supplemental Benefit Rate per Hour: $10.97

Mason Tender (Interior Demolition) - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.55
Supplemental Benefit Rate per Hour: $10.97

Mason Tender (Interior Demolition) - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.05
Supplemental Benefit Rate per Hour: $10.97

(Local #79)

METALLIC LATHER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Metallic Lather (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $22.55
Supplemental Benefit Rate per Hour: $17.87

Metallic Lather (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.60
Supplemental Benefit Rate per Hour: $16.87

Metallic Lather (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.60
Supplemental Benefit Rate per Hour: $15.92

Metallic Lather (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $25.65
Supplemental Benefit Rate per Hour: $14.92

(Local #46)

MILLWRIGHT

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Millwright (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $32.16
Supplemental Benefit Rate per Hour: $37.78

Millwright (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.61
Supplemental Benefit Rate per Hour: $41.48

Millwright (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $43.06
Supplemental Benefit Rate per Hour: $45.83

Millwright (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $53.96
Supplemental Benefit Rate per Hour: $52.59

(Local #740)

PAINTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Brush & Roller - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $17.60
Supplemental Benefit Rate per Hour: $19.09

Painter - Brush & Roller - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $22.00
Supplemental Benefit Rate per Hour: $24.46

Painter - Brush & Roller - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $26.40
Supplemental Benefit Rate per Hour: $28.80

Painter - Brush & Roller - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate per Hour: $35.20
Supplemental Benefit Rate per Hour: $37.24

(District Council of Painters)

PAINTER - BRIDGE & STRUCTURAL STEEL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Bridge & Structural Steel (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Painter - Bridge & Structural Steel (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Painter - Bridge & Structural Steel (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

(Local #806)

PAINTER - METAL POLISHER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Metal Polisher (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $19.67
Supplemental Benefit Rate per Hour: $8.66
New Construction - Wage Rate Per Hour: $20.06
Scaffold Over 34 Feet - Wage Rate Per Hour: $22.17

Metal Polisher (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.63
Supplemental Benefit Rate per Hour: $8.66
New Construction - Wage Rate Per Hour: $22.07
Scaffold Over 34 Feet - Wage Rate Per Hour: $24.13

Metal Polisher (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.60
Supplemental Benefit Rate per Hour: $8.66
New Construction - Wage Rate Per Hour: $24.14
Scaffold Over 34 Feet - Wage Rate Per Hour: $26.10

(Local 8A-28)

PLASTERER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)
(Each Term is 800 Hours.)

Plasterer - First Term

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $17.48

Plasterer - Second Term

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: $18.63

Plasterer - Third Term

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: $20.93

Plasterer - Fourth Term

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $22.10

(Local #262)

PLASTERER - TENDER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plasterer Tender - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.55
Supplemental Benefit Rate per Hour: $11.27

Plasterer Tender - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $23.30
Supplemental Benefit Rate per Hour: $11.27

Plasterer Tender - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.80
Supplemental Benefit Rate per Hour: $11.27

Plasterer Tender - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $27.30
Supplemental Benefit Rate per Hour: $11.27

(Local #79)

PLUMBER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plumber - First Year: 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $19.00
Supplemental Benefit Rate per Hour: $5.43

Plumber - First Year: 2nd Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.00
Supplemental Benefit Rate per Hour: $6.43

Plumber - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $30.22
Supplemental Benefit Rate per Hour: $22.73

Plumber - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $32.32
Supplemental Benefit Rate per Hour: $22.73

Plumber - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $35.17
Supplemental Benefit Rate per Hour: $22.73

Plumber - Fifth Year: 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $36.57
Supplemental Benefit Rate per Hour: $22.73

Plumber - Fifth Year: 2nd Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $48.64
Supplemental Benefit Rate per Hour: $22.73

(Plumbers Local #1)

POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER

(Exterior Building Renovation)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $32.76
Supplemental Benefit Rate per Hour: $15.10

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.09
Supplemental Benefit Rate per Hour: $20.30

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $42.97
Supplemental Benefit Rate per Hour: $24.05

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $51.60
Supplemental Benefit Rate per Hour: $25.05

(Bricklayer District Council)

ROOFER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Roofer - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 38% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $7.67

Roofer - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $17.69

Roofer - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $19.61

Roofer - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $23.45

Roofer - Fifth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.22

(Local #8)

SHEET METAL WORKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Sheet Metal Worker (0-6 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 25% of Journeyperson's rate
Supplemental Rate Per Hour: $7.64

Sheet Metal Worker (7-18 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 35% of Journeyperson's rate
Supplemental Rate Per Hour: $21.49

Sheet Metal Worker (19-30 Months)

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: $29.09

Sheet Metal Worker (31-36 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $34.41

Sheet Metal Worker (37-42 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $34.41

Sheet Metal Worker (43-48 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: $42.42

Sheet Metal Worker (49-54 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: $42.42

Sheet Metal Worker (55-60 Months)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: $47.76

(Local #28)

SIGN ERECTOR

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Sign Erector - First Year: 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 35% of Journeyperson's rate
Supplemental Rate Per Hour: $17.84

Sign Erector - First Year: 2nd Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: $20.25

Sign Erector - Second Year: 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: $22.66

Sign Erector - Second Year: 2nd Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $25.09

Sign Erector - Third Year: 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $33.83

Sign Erector - Third Year: 2nd Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: $36.81

Sign Erector - Fourth Year: 1st Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: $40.63

Sign Erector - Fourth Year: 2nd Six Months

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: $43.70

Sign Erector - Fifth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $46.76

Sign Erector - Sixth Year

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: $49.80

(Local #137)

STEAMFITTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Steamfitter - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate and Supplemental Per Hour: 40% of Journeyperson's rate

Steamfitter - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate and Supplemental Rate Per Hour: 50% of Journeyperson's rate.

Steamfitter - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate and Supplemental Rate per Hour: 60% of Journeyperson's rate.

Steamfitter - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate and Supplemental Rate Per Hour: 70% of Journeyperson's rate.

Steamfitter - Fifth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate and Supplemental Rate Per Hour: 80% of Journeyperson's rate.

(Local #638)

STEAMFITTER - REFRIGERATION & AIR CONDITIONER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Refrigeration & Air Conditioner (First Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $22.31
Supplemental Benefit Rate per Hour: $14.47

Refrigeration & Air Conditioner (Second Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $26.94
Supplemental Benefit Rate per Hour: $15.91

Refrigeration & Air Conditioner (Third Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $31.38
Supplemental Benefit Rate per Hour: $17.41

Refrigeration & Air Conditioner (Fourth Year)

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $37.90
Supplemental Benefit Rate per Hour: $19.44

(Local #638-B)

STONE MASON - SETTER

(Ratio Apprentice of Journeyperson: 1 to 1, 1 to 2)

Stone Mason - Setters - First 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Second 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Third 750 Hours

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Fourth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Fifth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Sixth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: 100% of Journeyperson's rate
Supplemental Rate Per Hour: 50% of Journeyperson's rate

(Bricklayers District Council)

TAPER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Drywall Taper - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $21.75
Supplemental Benefit Rate per Hour: $15.00

Drywall Taper - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $24.24
Supplemental Benefit Rate per Hour: $24.71

Drywall Taper - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $29.08
Supplemental Benefit Rate per Hour: $26.67

Drywall Taper - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate per Hour: $38.78
Supplemental Benefit Rate per Hour: $30.59

(Local #1974)

TILE LAYER - SETTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Tile Layer - Setter - First 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour:35% of Journeyperson's rate

Tile Layer - Setter - Second 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour 40% of Journeyperson's rate

Tile Layer - Setter - Third 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Tile Layer - Setter - Fourth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Tile Layer - Setter - Fifth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Tile Layer - Setter - Sixth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Tile Layer - Setter - Seventh 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

Tile Layer - Setter - Eighth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Tile Layer - Setter - Ninth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour:80% of Journeyperson's rate

Tile Layer - Setter - Tenth 750 Hours

Effective Period: 7/1/2024 - 6/30/2025
Wage and Supplemental Rate Per Hour: 90% of Journeyperson's rate

(Local #7)

TIMBERPERSON

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Timberperson - First Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: $24.96
Supplemental Rate Per Hour: $37.69

Timberperson - Second Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: $30.07
Supplemental Rate Per Hour: $37.69

Timberperson - Third Year

Effective Period: 7/1/2024 - 6/30/2025
Wage Rate Per Hour: $37.72
Supplemental Rate Per Hour: $37.69

Timberperson - Fourth Year

Effective Period: 7/1/2024 - 6/30/2025

Wage Rate Per Hour: $45.38
Supplemental Rate Per Hour: $37.69

(Local #1536)

THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
BUREAU OF LABOR LAW
1 CENTRE STREET
NEW YORK, NY 10007

BRAD LANDER
COMPTROLLER

COMPTROLLER'S PREVAILING WAGE MEMORANDUM REGARDING FLAG PERSONS

June 1, 2024

This memorandum supersedes and replaces the Comptroller's Prevailing Wage Memoranda dated May 21, 1998 and related clarification dated March 13, 2001 concerning Flag Persons. This memorandum sets forth the superseding determination of the New York City Comptroller concerning the applicability of Article 8, Section 220 of the New York Labor Law (the "Labor Law") to individuals who perform traffic control duty or "flagger" tasks in connection with public works construction projects within the jurisdiction of the City of New York. The guidance set forth herein is effective July 1, 2024 and applies only to public works contracts and subcontracts solicited on or after such date.

For purposes of this memorandum, "traffic control duty" means tasks necessary or appropriate to alleviate congestion by directing the flow of pedestrian and/or vehicular traffic away from the vicinity of the construction site using a sign or flag. Workers performing traffic control duty in connection with a public works construction project, whether or not such workers are on, adjacent to, or in close proximity to the construction site, are performing the work of a construction "laborer," as directing traffic away from the job site serves to protect the public and safeguard the work crew. Such workers are thus subject to the prevailing wage requirements of Article 8, Section 220 of the Labor Law as "laborers, workmen, or mechanics." Accordingly, the Prevailing Rate of Wages and Supplements applies to such individuals.

Additionally, workers who perform "flagger" tasks relating to the protection of the public and/or work crew, including but not limited to erecting traffic cones, setting up construction site barriers, and directing the movement of trucks or construction equipment in, on, and off the site, also are subject to the requirements of Article 8, Section 220 of the Labor Law and the Prevailing Rate of Wages and Supplements.

This position is consistent with the New York State Department of Labor's position under Article 8 of the New York Labor Law and the U.S. Department of Labor's position under the Davis-Bacon Act and will promote and streamline compliance with prevailing wage requirements on the various public works construction projects within New York City.

If the trade performing the underlying work performs its own flagging or traffic control, e.g., bridge painters, the flagger or traffic control worker shall receive the same wages as the underlying trade. In the absence of an underlying trade, the flagger or traffic control worker shall receive the wages as set forth in the "Flagger" section of the New York City Comptroller's Construction Worker Prevailing Wage Schedule.

Contractors, agencies, and members of the public are encouraged to contact the Bureau of Labor Law to seek clarification regarding specific instances to ensure compliance with prevailing wage regulations and this memorandum.

THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
1 CENTRE STREET ROOM 1120
NEW YORK, N.Y. 10007-2341

TELEPHONE: (212) 669-3622
FAX NUMBER: (212) 669-8499

Leonard A. Mancusi
SENIOR ASSISTANT COMPTROLLER

ALAN G. HEVESI
COMPTROLLER

MEMORANDUM

November 6, 2000

To *Agency Chief Contracting Officers*

From: *Leonard A. Mancusi*

Re: *Security at Construction Sites*

Prior to the enactment of Administrative Code §6-109, security guards on construction sites were not subject to prevailing wages. Security guards under the New York State labor law are covered under §230 which provides that prevailing wages are to be paid for security guards in existing buildings. §6-109 of the Administrative Code which was enacted in 1996 closed this loophole by including all security guards working pursuant to a city contract as a prevailing wage trade.

Although some construction contract boilerplate language has been amended to include §6-109, sub-contractors performing security services have advised us that they were not aware of this provision and, since traditionally, security guards were not a covered trade on construction sites, and they were not advised by a prime contractor that they would have to pay prevailing wages, they have not been doing so.

To avoid the possibility of issuing stop payments against prime contractors for the failure of their security service sub-contractors to pay

prevailing wages, we suggest that you write to all your existing security guard sub-contractors and their primes and in the future, upon approval of a security guard sub-contractor, advise the contractors of their obligation to pay prevailing wages under §6-109 of the Administrative Code.

As always, your cooperation is appreciated.

LAM:er
ACCO.SECURITY AT SITES

Changes between the 7/1/2022 and 7/1/2023 Single Contract General Conditions

NOTE: The list below is intended as a guide and does not include minor editing. The text of the General Conditions and the Addendum to the General Conditions govern.

Section No.	Change
01 10 00	1.10.C: Move to 01 29 00 1.5.E 1.10.D: Move to 01 29 00 1.5.G 1.13: Move to 01 29 00 1.6
01 21 13.10	New Section Added
01 25 00	New Section Added
01 29 00	New Section Added 1.5.G: Revise to incorporate Initial Mobilization Payment
01 32 00	2.2.A.17: Add photographs to daily report
01 32 16.10	1.11.C: Add owner coordination / special inspection requirements to two-week look-ahead schedule. 1.12.D.4.r: update language on permits
01 32 16.20	1.11.C: Add owner coordination / special inspection requirements to two-week look-ahead schedule. 1.12.D.4.h: Add permits to narrative report
01 32 16.30	1.11.C: Add owner coordination / special inspection requirements to two-week look-ahead schedule. 1.12.D.4.p: update language on permits
01 42 00	1.4: Add National Electrical Safety Code (NESC)
01 50 00	Add articles to make the following scopes payable via unit price: • 3.4.F: Temporary Electrical Service • 3.5.K: Temporary Heat • 3.8.F: Field Office • 3.14.H: Rodent and Insect Control • 3.18.D: Security Guards 3.5.D.2: Delete article 3.8.B.10: Update to include exterior lighting 3.8.B.13.e: Add new article for security cameras 3.8.C: Add language for security cameras 3.18.A.1: Revise language
01 54 23	Add Article 1.9 to make sidewalk sheds payable via unit price.
01 73 00	3.5.C: Revise language to include equipment 3.24: Move to 01 29 00 1.5.H
01 81 21	New Section Added
01 91 13	1.9.B: Update language to require review of Commissioning Plan

Note on Section 01 81 21: DDC intends to require EPD's for glazing and aluminum extrusions in the future, when those EPD's are commercially available.

Department of Design and Construction

Issue Date: July 1, 2023

DDC STANDARD GENERAL CONDITIONS

FOR SINGLE CONTRACT PROJECTS

Department of Design and Construction

Issue Date: July 1, 2023

(No Text on This Page)

DIVISION 01 – DDC STANDARD GENERAL CONDITIONS – SINGLE CONTRACT PROJECTS
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SECTION 01 10 00
SUMMARY

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. Addendum to the General Conditions: These General Conditions include and are supplemented by the Addendum to the General Conditions (the "Addendum"). The Addendum includes the following: (1) schedules referred to in these General Conditions, (2) information regarding the applicability of various articles, and (3) amended articles, if any.

1.2 SUMMARY:

A. This section includes the following:

1. Scope and Intent
2. Provisions Referenced in the Contract
3. Performance of Work During Non-Regular Work Hours (Pursuant to a Change Order)
4. Interruption of Services at Existing Facilities

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 SCOPE AND INTENT:

A. Description of Project: Refer to the Addendum for a description of the Project.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 B

B. LEED: The City of New York will seek U.S. Green Building Council (USGBC) LEED (Leadership in Energy and Environmental Design) certification for this Project as specified in Section 01 81 13.03 "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS"; or Section 01 81 13.04 "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS", and the Addendum to the General Conditions.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 C

C. COMMISSIONING: The Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS, and/ or Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE and the Addendum to the General Conditions. The Contractor must cooperate with the commissioning agent and provide whatever assistance is required.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 D

D. PROGRESS SCHEDULE: Refer to Section 01 32 16.1 PROGRESS SCHEDULES (METHOD A) or 01 32 16.2 PROGRESS SCHEDULES (METHOD B) or 01 32 16.3 PROGRESS SCHEDULES (METHOD C) and the Addendum to the General Conditions for requirements of the Project.

E. COMPLETION OF WORK: Work to be done under the Contract is comprised of the furnishing of all labor, materials, equipment and other appurtenances, and obtaining all regulatory agency approvals necessary and required to complete the construction work in accordance with the Contract.

F. OMISSION OF DETAILS: All work called for in the Specifications applicable to the Contract but not shown on the Contract Drawings in their present form, or vice versa, is required, and must be performed by the Contractor as though it were originally delineated or described. The cost of such work will be deemed included in the total Contract Price.

G. WORK NOT IN SPECIFICATIONS OR CONTRACT DRAWINGS: Work not particularly specified in the Specifications nor detailed on the Contract Drawings but involved in carrying out their intent or in the complete and proper execution of the Work, is required, and must be performed by the Contractor. The cost of such work will be deemed included in the total Contract Price.

H. SILENCE OF THE SPECIFICATIONS: The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, will be regarded as meaning that only the best practice is to prevail and that only the best material and workmanship is to be used and interpretation of the Specifications will be made upon that basis.

I. CONFLICT BETWEEN CONTRACT DRAWINGS AND SPECIFICATIONS: Should any conflict occur in or between the Drawings and Specifications, the Contractor will be deemed to have estimated the most expensive way of doing the Work unless the Contractor asked for and obtained a decision in writing from the Commissioner before the submission of the bid as to what must govern.

1.5 CONTRACT DRAWINGS AND SPECIFICATIONS:

A. SCHEDULE C - The Contract Drawings are listed in Schedule C, which is set forth in the Addendum. Such drawings referred to in the Contract, and in the applicable Specifications for the Contract, bear the general title:

City of New York
Department of Design and Construction
Division of Public Buildings

B. DOCUMENTS FURNISHED TO THE CONTRACTOR - After the award of the Contract, the Contractor will be furnished with five (5) complete sets of paper prints of all Contract Drawings mentioned in Paragraph A above, as well as a copy of the Specifications.

C. ADDITIONAL COPIES of Drawings and Specifications, when requested, will be furnished to the Contractor if available.

D. SUPPLEMENTARY DRAWINGS - When, in the opinion of the Commissioner, it becomes necessary to more fully explain the work to be done, or to illustrate the work further, or to show any changes which may be required, drawings known as Supplementary Drawings will be prepared by the Commissioner.

E. COMPENSATION - Where Supplementary Drawings entail extra work, compensation therefore to the Contractor will be subject to the terms of the Contract. The Supplementary Drawings will be binding upon the Contractor with the same force as the Contract Drawings.

F. SUPPLEMENTARY DRAWING PRINTS - Three (3) copies of prints of these Supplementary Drawings will be furnished to the Contractor.

G. COPIES TO SUBCONTRACTORS - The Contractor must furnish each of its subcontractors and material suppliers such copies of Contract Drawings, Supplementary Drawings, or copies of the Specifications as may be required for its work.

1.6 COORDINATION:

A. COORDINATION AND COOPERATION - The Contractor must consult and study the requirements of the Contract Drawings and Specifications for all required work, including all work to be performed by trade subcontractors, so that the Contractor may become acquainted with the work of the Project as a whole in order to achieve the proper coordination and cooperation necessary for the efficient and timely performance of the work.

B. CONTRACTOR TO CHECK DRAWINGS: - The Contractor must verify all dimensions, quantities and details shown on the Contract Drawings, Schedules, or other data received from the Commissioner, and must notify the Commissioner of all errors, omissions, conflicts and discrepancies found therein. Notice of such errors will be given before the Contractor proceeds with any work. Figures must be used in preference to scale dimensions and large-scale drawings in preference to small-scale drawings.

1.7 SHOP DRAWINGS AND RECORD DRAWINGS:

A. Refer to Section 01 33 00 SUBMITTAL PROCEDURES and Section 01 78 39 CONTRACT RECORD DOCUMENTS for requirements applicable to shop drawings and record drawings.

1.8 TEMPORARY FACILITIES, SERVICES AND CONTROLS:

A. Refer to Section 01 50 00 TEMPORARY FACILITIES SERVICES AND CONTROLS for the responsibilities of the Contractor.

1.9 DUST CONTROL:

A. The Contractor must prepare, execute and manage a “Dust Control Plan” for the prevention of the emission of dust from construction related activities in compliance with 15 RCNY 13-01 et. seq.

1.10 PROVISIONS REFERENCED IN THE CONTRACT:

A. SCHEDULE A - Various Articles of the Contract refer to requirements set forth in Schedule A of the General Conditions. Schedule A, which is included in the Addendum, sets forth (1) the referenced Articles of the Contract, and (2) the specific requirements applicable to the Contract.

B. EXTENSION OF TIME - Applications for Extensions of Time, as indicated in Article 13 of the Contract, must be made in accordance with the Rules of the Procurement Policy Board.

C. ULTRA LOW SULFUR DIESEL FUEL AND BEST AVAILABLE TECHNOLOGY REPORTING: The Contractor must submit reports to the Commissioner regarding the use of Ultra Low Sulfur Diesel Fuel in Non-Road Vehicles, and the implementation of Best Available Technology (BAT), as set forth in Article 5.4 of the Contract. Such reports must be submitted in accordance with the schedule, format, directions, and procedures established by the Commissioner.

1.11 PERFORMANCE OF WORK DURING NON-REGULAR WORK HOURS:

A. NON-REGULAR WORK HOURS: The Commissioner may issue a change order in accordance with Article 25 of the Contract which, (1) directs the Contractor to perform the Work, or specific components thereof, during other than regular work hours (i.e., evenings, weekends and holidays), and (2) provides compensation to the Contractor for costs in connection with the performance of Work during other than regular work hours. The Commissioner may issue a change order if a delay has occurred and such delay is not the fault of the Contractor, or if the Work is of such an important nature that delay in completing such work would result in serious disadvantage to the public.

B. PROCEDURE: The Contractor must: (1) obtain whatever permits may be required for performance of the Work during other than regular business hours, and (2) pay all necessary fees in connection with such permits. In addition, if directed by the Commissioner, the Contractor must make immediate application to the Commissioner of the Department of Labor, State of New York, for dispensation in accordance with Subdivision 2 of Section 220 of the Labor Law.

1.12 INTERRUPTION OF SERVICES AT EXISTING FACILITIES:

A. EVENING AND WEEKEND WORK - Where performance of the Work requires the temporary shutdown(s) of services, such shutdown(s) must be made at night or on weekends or at such times that will cause no interference with the established routines and operations of the facility in question.

1 Where weekend or evening work is required due to unavoidable service shutdowns, such work will be performed at no extra cost to the City. Components of the Work that must be performed during other than regular work hours are indicated in the Drawings and/or the Specifications.

B. INTERRUPTION OF EXISTING FACILITIES:

1 The Contractor must not interrupt any of the services of the facility nor interfere with such services in any way without the permission of the Commissioner. Such interruption or interferences must be made as brief as possible, and only at such time stated.

2 Under no circumstances will the Contractor, its subcontractors, or its workers, be permitted to use any part of the project as a shop, without the permission of the Commissioner.

3 Unnecessary noise must be avoided at all times and necessary noise must be reduced to a minimum.

4 Toilet facilities, water, and electricity must be operational at all times (i.e. 24/7). No services of the facility can be interrupted in any way without the permission of the Commissioner. Careful coordination of all Work with the Resident Engineer must be done to maintain the operational level of the Project personnel at the facility.

5 The Contractor must schedule the Work to avoid noise interference that will affect the normal functions of the facility. In particular, construction operations producing noises that are objectionable to the functions of the facility must be scheduled at times of day or night, day of the week, or weekend, which will not interfere with personnel at the facility. Any additional cost resulting from this scheduling will be borne by the Contractor.

6 The Contractor must arrange to work continuously, including evening and weekend hours, if required, to assure that services will be shut down only during the time actually required to make the necessary connections to the existing facility.

7 The Contractor must give ample written notice in advance to the Commissioner and personnel at the facility of any required shutdown.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 10 00

(No Text This Page)

SECTION 01 21 13.10

PRICE ADJUSTMENT ALLOWANCE

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 21 13.10

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) City of New York Standard Construction Contract.

1.2 SUMMARY

A. This Section includes:

1. Asphalt Price Adjustment

2. Fuel Price Adjustment

3. Steel Price Adjustment

1.3 SCOPE AND INTENT

A. This section will provide for additional compensation to the Contractor for increases, or repayment by the Contractor for decreases, in the price of asphalt, fuel, or steel products.

B. Price Adjustments will be made only for eligible work as defined below. With respect to asphalt and steel eligible work items, price adjustment will be paid, if eligible, only after the items have been permanently incorporated into the Work and accepted by the Commissioner. With respect to fuel, price adjustment will be paid, if eligible, only after fuel has been delivered to the Project site.

C. No adjustment will be provided for any extra work paid by fixed price in accordance with the Standard Construction Contract Article 25.3.2 or paid for on a time and material basis per Standard Construction Contract Article 26. Additional quantities of existing Contract pay items at original bid prices will be considered eligible for asphalt, fuel, and steel price adjustments.

D. Temporary work performed by the Contractor at its own expense will not be eligible for price adjustment. Notwithstanding the foregoing, temporary asphalt will be eligible if shown on the Contract Drawings or required to complete the Work and must be approved in advance by the Commissioner.

E. The Contractor, its Subcontractor(s) and/or Materialmen, must, when directed by the Commissioner, provide

any and all Project documents and/or records the Commissioner deems pertinent to his/her determination with respect to the price adjustment. If requested by the Commissioner, the Contractor, its Subcontractor(s) and/or Materialmen, must provide copies of Project documents and/or records.

F. Failure by the Contractor, its Subcontractor(s) and/or Materialmen, to comply strictly with the requirement to provide Project records will constitute a waiver of any claim for additional compensation the Contractor may have in connection with the price adjustment request.

G. Project documents and/or records include, without limitation, Bid and Contract Documents, shop drawings, manufacturing and/or shipping data, as-built drawings, books of account, financial statements, invoices, vouchers, records, daily job diaries and reports.

H. If the Contractor is paid additional compensation in accordance with this Section, the Contractor must pay a properly allocated share of such additional compensation to the applicable Subcontractor(s) and/or Materialmen.

1.4 PRICE ADJUSTMENT VALUES

A. The monthly average asphalt prices, monthly average fuel prices, steel cost basis and steel index values will be posted on the NYS Department of Transportation (NYSDOT) website: https://www.dot.ny.gov/main/business-center/contractors/construction-division/fuel-asphalt-steel-price-adjustments

B. Historical index values are available as issued Engineering Bulletins on the NYSDOT website: https://www.dot.ny.gov/eieb

1.5 ASPHALT PRICE ADJUSTMENT

A. **Price Changes.** The asphalt price adjustment will be based solely on the price changes for asphalt as determined by the formulas below. No adjustment will be made if the monthly average posted price is within $15.00 of the asphalt index price. No consideration will be given to the situation where the price paid by the Contractor, its Subcontractors, or the Contractor's or Subcontractor's supplier(s) exceeds the monthly average posted price.

B. **Applicability**. The asphalt price adjustment will apply to all permanent asphalt pavement items. The asphalt price adjustment will apply to temporary asphalt pavement if the temporary asphalt is shown on the Contract Drawings or approved in advance by the Commissioner. No price adjustment will be made for tack coat or pothole cold patch.

C. **Prices**. The asphalt index price and the monthly average posted price are defined as follows:

1. Asphalt Index Price. The asphalt index price is a price per ton of binder (also referred to as liquid bitumen or asphaltic cement) used solely as a basis from which to compute asphalt price adjustments. The asphalt index price will be the monthly average posted price for the month and year the bid opening for the Project.

2. Monthly Average Posted Price. The monthly asphalt index prices will be determined by NYSDOT using the methods set forth in NYSDOT Standard Specification Section 698.

D. **Quantity**. The quantity of asphalt in tons considered for adjustment will be determined by the tons of asphalt

actually placed. This will be calculated using the measured volume of asphalt placed, and the asphalt's in-place density, as measured in the field. Quantities of asphalt will be measured to the nearest 0.1 ton.

E. **Adjustment**. Asphalt price adjustment will be based on the following formulas:

1. When price increases: Price Adjustment = (Quantity of Asphalt) x (Monthly Average Posted Price – Asphalt Index Price - $15.00)

2. When price decreases: Price Adjustment = (Quantity of Asphalt) x (Monthly Average Posted Price – Asphalt Index Price + $15.00)

F. **Payment of the Price Adjustment.** The Contractor is required to keep a log of all asphalt incorporated into the Project that is eligible for the price adjustment. The log must keep track of the date when the asphalt was purchased, the quantity of the asphalt, the Asphalt Index Price and the Monthly Average Posted Price, as determined in accordance with 1.5.C.

1. When the adjustment amount, calculated in accordance with 1.5.E, exceeds $10,000.00 for all eligible asphalt incorporated into the Project, the Contractor must submit with its monthly payment requisition, the request for payment of the asphalt price adjustment.

1.6 FUEL PRICE ADJUSTMENT

A. **Price Changes**. The fuel price adjustment will be based solely on the price changes for fuel as determined by the formulas below. No adjustment will be made if the monthly average posted price is within $0.10 per gallon of the fuel index price. No consideration will be given to the situation where the price paid by the Contractor, its Subcontractors, or the Contractor's or Subcontractor's supplier(s) exceeds the monthly average posted price.

B. **Applicability**. The intent of the fuel price adjustment is to cover on-site equipment and vehicles only as delineated below.

1. The fuel price adjustment will apply for fuel used in:
   a. Diesel equipment used on site, such as backhoes, excavators, cranes.
   b. Stationary equipment used on site, such as trailer or skid mounted compressors, generators, or light towers.
   c. Gasoline or diesel trucks and vans that are assigned to the site full-time, which may be used for off-site pickups and deliveries.
   d. Equipment used for temporary heating.

2. The fuel price adjustment will not apply to:
   a. On-site gasoline powered hand tools, such as chainsaws, cut-off saws, pressure washers, small generators, etc.
   b. Vehicles (cars, pickup trucks) that are also used for commuting.
   c. Delivery vehicles.
   d. Any equipment at the Contractor's shop, manufacturer's shop, or other off-site facility.

C. **Prices**. The fuel index price and the monthly average posted price are defined as follows:

1. Fuel Index Price. A price per gallon of fuel used solely as a basis from which to compute fuel price adjustments. The fuel index price will be the monthly average posted price for the month of the bid letting.

2. Monthly Average Posted Price. The monthly fuel index prices will be determined by NYSDOT using the methods set forth in NYSDOT Standard Specification Section 698.

D. **Quantity**. The quantity of fuel in gallons considered for adjustment will be determined by invoices for fuel delivered to the Project site. Quantities of fuel will be measured to the nearest 0.01 gallon.

E. **Adjustment**. Fuel price adjustment will be based on the following formulas:

1. When price increases: Price Adjustment = (Quantity of Fuel) x (Monthly Average Posted Price - Fuel Index Price - $0.10)

2. When price decreases: Price Adjustment = (Quantity of Fuel) x (Monthly Average Posted Price - Fuel Index Price + $0.10)

F. **Payment of the Price Adjustment.** The Contractor is required to keep a log of all fuel incorporated into the Project that is eligible for the price adjustment. The log must keep track of the date when the fuel was purchased, the quantity of the fuel, the Fuel Index Price and the Monthly Average Posted Price, as determined in accordance with 1.6.C.

1. When the adjustment amount, calculated in accordance with 1.6.E, exceeds $10,000.00 for all eligible fuel delivered to the Project site, the Contractor must submit with its monthly payment requisition, the request for payment of the fuel price adjustment.

1.7 STEEL PRICE ADJUSTMENT

A. **Applicability**. The intent of the steel price adjustment is to cover steel materials as follows. For the purposes of this section, steel includes all steel alloys, stainless steel alloys, iron, and ductile iron.

1. Steel price adjustment will apply to groups of similar material content (“Material Groups”) within a specification section (e.g., structural steel shapes under 05 21 00 – Structural Steel Framing or reinforcing bars under 03 20 00 – Concrete Reinforcing).

2. The steel price adjustment will apply to the following Material Groups:
   a. Structural steel and joists
   b. Reinforcing bars
   c. Steel deck pans
   d. Cold formed steel framing and trusses
   e. Stair stringers and pans
   f. Steel dunnage for equipment
   g. Steel piling
   h. Drainage, water, and electrical piping and tubing
   i. Steel doors
   j. Municipal steel and iron castings (manhole covers, sewer grates, etc.)

3. The steel price adjustment will not apply to the following:
   a. Steel in fabricated elements, such as HVAC chillers or electrical fixtures and boxes
   b. Handrails, access ladders, and other miscellaneous metals
   c. Anchor bolts and fasteners

B. For each Material Group listed, the Contractor must also identify the parties whose relationship establishes the invoice date. If the parties are known, they must be identified by name. If the two parties are not

known, they must be identified by role (Contractor, Subcontractor, Materialman, fabricator, etc.). Different parties may be identified for scopes within a Material Group for the purposes of establishing an invoice date. If the Contractor does not provide a list of materials to which to apply the steel price adjustment, no steel price adjustment will be made.

C. If the percentage change for a given month does not exceed 5% plus or minus, from the benchmark steel index, no adjustments will be made for materials invoiced that month.

D. The percentage change for each material group identified in Article 1.7.A.2 above will be determined using the month that the largest value of materials were invoiced.

E. The weight of the steel must exclude minor appurtenances individually weighing less than 5 lbs (i.e., nuts, bolts, washers, etc.) and non-steel components, such as door insulation or glazing. Precast or prestressed concrete items must have total reinforcing steel weight listed on the approved shop drawings. The following sources must be used, in declining order of precedence, to determine the weight of steel: approved shop drawings; verified shipping documents; Contract Documents; industry standards (i.e., AISC Manual of Steel Construction, AWWA Standards, etc.); and manufacturer's data.

1. **Indexes and Prices**. Adjustments are based on the Producer Price Index (PPI) for Semifinished Steel Mill Products (WPU 101702). PPI values are published by the US Department of Labor, Bureau of Labor Statistics (BLS). Recent PPI values are posted on the NYSDOT website linked above. The Cost Basis, Benchmark Steel Index, Monthly Steel Index, and the Percentage Change are defined as follows:

   a. **Cost Basis (CB).** An average price of steel products in dollars per ton used solely as a cost basis from which to compute steel price adjustments. The cost basis for original Contract bid price items and additional work at the original Contract bid price will be the cost basis listed for the month of the bid letting. The cost basis for additional work at agreed price will be the value of the cost basis for the month the agreed price was submitted to the Commissioner.
   b. **Benchmark Steel Index (BI).** The benchmark steel index for original Contract bid price items and additional work at the original Contract bid price will be the value of the preliminary PPI for the month of the bid letting. The benchmark steel index for additional work at agreed price will be the value of the preliminary PPI for the month the agreed price was submitted to the Commissioner.
   c. **Monthly Steel Index (MI)**. Value of the final PPI for the month the material is invoiced.
   d. **Percent Change**. The percent change in any given month will be determined as follows:

$$Percentage\ Change = \left(\frac{MI - BI}{BI} \right) x\ 100$$

F. The quantity of steel for adjustment of each Material Group will be measured to the nearest 0.1 tons.

1. **Percent Change Greater Than +5%**. If the Percentage Change is greater than +5% from the benchmark steel index, Price Adjustments will be made for materials invoiced that month. The Contractor must provide the Commissioner a detailed list of the weight of eligible materials within 60 calendar days after installation, including: the Contract pay item, the weight of steel, the month(s) of invoice, the source used to determine the weight, and if requested by the Commissioner, copies of invoices to verify the month of invoice.

2. **Percent Change -5% to +5%.** If the Percentage Change is between -5% and +5%, inclusive, from the benchmark steel index, no adjustments will be made for materials invoiced that month.

3. **Percent Change Lower Than -5%.** If the Percentage Change is lower than -5% from the benchmark steel index, a Price Adjustment will be charged to the Contractor for materials invoiced that month. The Contractor must provide the Commissioner a detailed list of the weight of eligible materials within 60 calendar days after installation, including: the Contract pay item, the weight of steel, the month(s) of invoice, the source used to determine the weight, and copies of invoices to verify the month of invoice.

G. **Adjustment.** Steel price adjustment will be made for all the materials which the Contractor opted to apply the steel price adjustment, based on the following formulas:

1. When price increases:

$$Price\ Adjustment = \left[\left(\frac{MI - BI}{BI}\right) - 0.05\right](CB)\,Qty$$

2. When price decreases:

$$Price\ Adjustment = -\left[\left(\frac{MI - BI}{BI}\right) + 0.05\right](CB)\,Qty$$

H. **Payment of the Price Adjustment.** Steel Price Adjustment will be paid once during the Project duration for each eligible Material Group after the final PPI is available to set the Monthly Steel Index for the invoice month determined in Article 1.7.D above.

1.8 MEASUREMENT AND PAYMENT

A. The fixed sum shown in the Bid Breakdown or Bid Schedule for Price Adjustments Allowance will be considered the price bid for this item. The fixed sum is not to be altered in any manner by the bidder. Should the amount shown be altered, the new figures will be disregarded and the original price will be used to determine the total amount bid for the Contract. The fixed sum payment made under this item will be equal to the sum of payments and credits for price adjustments, as approved by the Commissioner, with no markup for overhead, profit, or other fees allowed. The fixed sum amount is included in the bid solely to ensure that sufficient monies will be available to pay the Contractor for the price escalation adjustment payments as delineated herein, which may be more or less than the fixed sum amount.

PART II – PRODUCTS (NOT USED)

PART III – EXECUTION (NOT USED)

END OF SECTION 01 21 13.10

SECTION 01 22 00

EXPANDED WORK ALLOWANCE

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 22 00

PART I - GENERAL

1.1 PURPOSE

A. An Allowance has been established for the items set forth in sub-section 1.3 below ("Expanded Work Allowance" or "EWA"). Payment for the items set forth in sub-section 1.3 ("Expanded Work Items") may be made through the EWA, as directed by the Commissioner. "Extra Work", "overrun", and "Allowance" are defined by the Standard Construction Contract (see Articles 2.1.16, 26.1, and 2.1.4, respectively) and nothing in this Section alters, or will be deemed to alter the interpretation or application of, the Standard Construction Contract, including but not limited to Articles 25, 26, 28, and 78 of the Standard Construction Contract.

1.2 PROCESS

A. If the Commissioner determines that use of the EWA is appropriate, in their sole discretion, the Commissioner will prepare a written scope document for the Expanded Work Items for the Contractor's execution ("EWA Scope Memo"). The EWA Scope Memo will set forth the maximum amount payable from the EWA prior to the execution of a final cost memorandum ("Maximum Amount"), in accordance with this Section. The Maximum Amount may be increased from time to time by the Commissioner, in their sole discretion, except that the Maximum Amount may not exceed 80% of the Commissioner's estimated total cost for such Work (the "Estimated Cost") unless and until a final cost is determined and a final cost memorandum ("Final Cost Memo") executed in accordance with this Section.

B. Neither the Maximum Amount nor the Estimated Cost will be deemed to be the final cost of the Expanded Work Items. The final cost for the Expanded Work Items will be determined in accordance with Article 26 of the Standard Construction Contract. The Contractor must submit its detailed price proposal for the Expanded Work Items, calculated in accordance with the Contract, within the time period set forth in the EWA Scope Memo or within 90 Days after the executed EWA Scope Memo is issued to the Contractor, whichever is sooner.

C. Once the EWA Scope Memo is executed and the Contractor is directed to proceed with the Work, DDC will make progress payments, as provided in the Contract, up to the Maximum Amount or until the submission period has expired, whichever occurs sooner.

D. DDC will not make any progress payments for the performance of the Expanded Work Items beyond the submission period set forth in sub-Section C, above, unless and until a final cost has been determined and a Final Cost Memo executed in accordance with this Section. No amounts above the Maximum Amount set by the Commissioner will be payable from the EWA, unless and until a final cost has been determined and a Final Cost Memo executed in accordance with this Section. In all events, the Contractor shall promptly and diligently comply with the Commissioner's direction and perform all Work required by the Contract and the EWA Scope Memo.

E. Upon receipt of the Contractor's cost detailed proposal, DDC will evaluate the proposal and initiate negotiations, as necessary, to determine the final cost of the Expanded Work Items in accordance with Article 26 of the Standard Construction Contract. The Contractor is responsible to furnish time and material records

in accordance with Article 28 of the Standard Construction Contract until a Final Cost Memo is executed. If the parties cannot agree on a unit price or fixed price, the Contractor will be paid on the basis of time and material records in accordance with Article 26 the Standard Construction Contract.

F. A Final Cost Memo will be prepared by the Commissioner to be executed by the parties. The total net sum of the amounts added and/or credited under the EWA Scope Memo and payment of the finalized Final Cost Memo constitutes full accord and satisfaction for the costs resulting from the Expanded Work Items. In the event the EWA is insufficient to pay the full amount of the Final Cost Memo, the parties agree to execute change order documents for the remaining funds, subject to registration in accordance with the New York City Charter.

1.3 PRICE TO COVER

A. Expanded Work Items are those items set forth below. The EWA may be used, in the Commissioner's discretion, for the following Expanded Work Items:
   1. Non-material changes in the Work necessary to complete Contract Work due to site conditions that differ from those included in the Contract Documents and that could not have been anticipated by the Contractor.
   2. Non-material changes in the Work directed by the Commissioner that result in a net change in the cost to the Contractor for the Work to be performed under this Contract, including but not limited to the following:
      a. Overruns of unit price items and quantity increases in portions of work within a lump sum item.
      b. NYCDOT traffic stipulations or permit requirements that significantly differ from those included in the Contract Documents and that could not have been anticipated by the Contractor.
      c. Changes to the sizes of materials or changes to specifications of materials.
      d. Materials/structures not included in the Contract Documents that are necessary to complete Contract Work and that could not have been anticipated by the Contractor.

1.4 BASIS OF PAYMENT

A. The fixed sum must be considered the price bid for this item. The fixed sum is not to be altered in any manner by the bidder. Should the amount shown be altered, the new figures will be disregarded, and the original price will be used to determine the total amount bid for the contract.

B. The payment(s) made under this item will be equal to the Final Cost Memo prepared by the Commissioner and executed by the parties in accordance with 1.2(F) above as proof of work performed for this item as approved by the Commissioner.

C. The total estimated cost of this item is the "fixed sum" amount shown for this item in the Bid Submission Form and shall not be varied in the bid. The "fixed sum" amount is included in the bid solely to ensure that sufficient monies will be available to pay the Contractor for this work, which may be more or less than the fixed sum amount.

D. The price will cover the cost of all labor, materials, equipment, insurance, and incidentals necessary to complete the work under this section in accordance with the Contract Drawings, the specifications, and the directions of the Commissioner.

PART II – PRODUCTS (Not Used)
PART III – EXECUTION (Not Used)

END OF SECTION 01 22 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART I GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]..

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by named or unnamed manufacturers. (i.e., “or approved equal” products)

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor that are not required to meet other Project requirements but may offer advantage to Contractor. Substitutions for Convenience are not permitted.

B. A substitution is not an “or approved equal” or a product, material, equipment, or method of construction that meets the requirements of the Contract Documents. A substitution is a change to the Contract, which, upon approval, will result in a change order.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form acceptable to the Commissioner.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.

b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by others that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with applicable codes and standards.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Commissioner's Action: If necessary, Commissioner will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Commissioner will notify Contractor of acceptance or rejection of proposed substitution within 10 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Commissioner's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Commissioner does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: The Contractor must investigate and document compatibility of proposed substitution with related products and materials. The Contractor must engage a qualified testing agency to perform compatibility tests recommended by manufacturers or the Commissioner. These investigations, documentation, and testing will be at the Contractor’s sole expense.

1.6 PROCEDURES

A. Change Orders: A substitution is a Contractor-initiated change order request. Before a substitution can be implemented, it must pass through two approval processes: substitution approval per Article 1.7 below, and change order approval. If the substitution receives approval, as part of the change order process, the Contractor may request that the Commissioner consider granting advanced authorization.

B. Coordination during preparation of substitution: The Contractor, when developing a substitution, must address the designer's objectives, environmental permit requirements and regulations, commitments made to the public to mitigate the impact of construction, and other such concerns.

C. Coordination during execution of substitution: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

D. Conditions: The Contractor must not base any bid process on the anticipated approval of a substitution and should recognize that any substitution may be rejected. The following terms and conditions apply to a substitution:

1. A substitution will only be considered after the contract is awarded.

2. A substitution applies only to the contract for which it was submitted. One substitution must not be submitted for multiple contracts. Approval or disapproval of a substitution on one contract does not guarantee approval or disapproval on another contract.

3. The substitution request becomes the property of the City and will contain no restrictions imposed by the Contractor on its use or disclosure. The City will have the right to use, duplicate, and disclose in whole or in part any data necessary for the utilization of the substitution. The City retains the right to utilize any accepted or rejected substitution or part thereof on any other project without any obligation to the Contractor.

4. When the Commissioner is in the process of making design and specification revisions and a Contractor submits a substitution with similar revisions, the Commissioner will reject the substitution.

5. A substitution will be considered only if reasonable, cost-effective options are not provided in the Contract Documents.

6. The Commissioner will be the sole judge as to whether a substitution qualifies for consideration and evaluation. The Commissioner may reject any substitution that requires excessive time or costs for design review, evaluation, and/or investigations. The Commissioner will be the sole judge in determining if the proposed substitution will result in a sufficient amount of direct or indirect cost savings to offset the City's effort to review the substitution.

7. A substitution must be consistent with DDC's design policies and basic design criteria, provide the same service life or more, facilitate economy of operations, ease of maintenance, and achieve the desired appearance and safety.

8. The simple elimination of work does not necessarily constitute a substitution, however, a substitution which introduces a simple material substitution, or elimination of work, may be considered if it is accompanied by a design change or change in the construction method. A simple material substitution which introduces a new material to DDC may be also considered.

9. The substitution must not be experimental in nature but will have been proven to the Commissioner's satisfaction under similar or acceptable conditions on another City contract or at another location acceptable to the Commissioner.

10. If the Commissioner requires any additional information to evaluate the substitution, this information must be provided in a timely manner. Unless otherwise mutually agreed upon, failure to do so will result in the rejection of the substitution. An incomplete or a poor-quality substitution which hinders the Commissioner's review may also result in the rejection of the substitution.

11. The Contractor must allow submissions of substitution from an approved subcontractor, provided that reimbursement is made by the City to the Contractor and that the terms of payment to the Subcontractor are satisfactorily negotiated and accepted before the substitution is submitted to the Commissioner. Subcontractors may not submit a substitution except through the Contractor.

12. A substitution approved by the Commissioner will be a revision to the Contract Documents and progress schedule. Consequently, if unsatisfactory results are being achieved or adjustments are necessary during implementation of a substitution, the rejection of work, removal of work, addition of work, or revision of work must be evaluated in accordance with the Contract requirements.

13. No work related to a substitution will be performed under allowance items. Agreed prices must be reached for the substitution before the substitution is approved. If the Contractor is deemed to have taken reasonable diligence in determining the work involved but if during the construction of substitution work a significant change in the character of work occurs, the Commissioner may consider new agreed prices.

14. The Contractor will receive written notification from the Commissioner when the substitution is approved. Material orders placed prior to substitution approval are placed at the Contractor's risk.

15. Once a substitution has been approved, the substitution will then be submitted as a change order and processed accordingly. The Contractor is responsible for submitting all appropriate information to the Commissioner in a timely manner.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 30 days prior to time required for preparation and review of related submittals.

1. Conditions: Commissioner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Commissioner will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Substitution request is fully documented and properly submitted.
   c. Requested substitution will not adversely affect Contractor's construction schedule.
   d. Requested substitution has received necessary approvals of authorities having jurisdiction.
   e. Requested substitution is compatible with other portions of the Work.
   f. Requested substitution has been coordinated with other portions of the Work.
   g. Requested substitution provides specified warranty.
   h. If requested substitution involves more than one subcontractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all subcontractors involved.

B. Substitutions for Convenience: Not allowed.

PART II – PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012900

PAYMENT PROCEDURES

PART I - **GENERAL**

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process payment requisitions.

B. Related Requirements:

1. Sections 013216.10, 013216.20, or 013216.30 "Project Schedules (Method A/B/C)" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's payment requisitions. The Schedule of Values serves as the Bid Breakdown on Lump Sum per Article 41 of the Standard Construction Contract.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's construction schedule per Sections 013216.10, 013216.20, or 013216.30. If Section 013216.30 is used and the Contractor’s Critical Path Method Schedule is cost loaded, it will serve as the Schedule of Values.

1. Coordinate line items in the Schedule of Values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the Schedule of Values to the Commissioner at earliest possible date and as required in Standard Construction Contract Article 41.1.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Arrange Schedule of Values consistent with format provided by the Commissioner.

2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of payment request and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

3. Allowances and Unit Prices: Provide a separate line item in the Schedule of Values for each allowance and unit price item. Show line-item value of unit price items, as a product of the unit cost, multiplied by measured quantity.

4. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place, as separate line items.

5. Schedule of Values Revisions: Revise the Schedule of Values when Change Orders result in a change in the lump sum price. Include at least one separate line item for each Change Order.

1.5 PAYMENT REQUISITIONS

A. Each payment requisition following the initial payment requisition must be consistent with previous requisitions and payments, as certified by the Commissioner. Each partial payment requisition must comply with the requirement of Article 42 of the Standard Construction Contract.

B. Payment Requisition Times: Submit payment requisition to Commissioner by the end of the month following the payment period. The period covered by each payment requisition is one month, ending on the last day of the month. A longer payment period may be submitted to the Commissioner for approval.

1. Submit draft copy of payment requisition seven days prior to due date for review by Commissioner.

C. Payment Requisition Forms: Use forms provided by the Commissioner as form for payment requisitions.

D. Payment Requisition Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Commissioner will return incomplete payment requisitions without action.

1. Entries shall match data on the Schedule of Values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous payment requisition, whether or not payment has been received. Include only amounts for work completed at time of payment requisition.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by requisition.

E. PARTIAL PAYMENTS FOR MATERIALS IN ADVANCE OF THEIR INCORPORATION IN THE WORK PURSUANT TO ARTICLE 42 OF THE CONTRACT – In order to better ensure the availability of materials, fixtures and equipment when needed for the work, the Commissioner may authorize partial payment for certain materials, fixtures and equipment, prior to their incorporation in the work, but only in strict accordance with, and subject to, all the terms and conditions set forth in the Specifications, unless an alternate method of payment is elsewhere provided in the Specifications for specified materials, fixtures or equipment.

1. The Contractor must submit to the Commissioner a written request, in quadruplicate, for payment for materials purchased or to be purchased for which the Contractor needs to be paid prior to their actual incorporation in the work. The request must be accompanied by a schedule of the types and quantities of materials, and must state whether such materials are to be stored on or off the site.

2. Where the materials are to be stored off the site, they must be stored at a place other than the Contractor's premises (except with the written consent of the Commissioner) and under the conditions prescribed or approved by the Commissioner. The Contractor must set apart and separately store at the place or places of storage all materials and must clearly mark same "PROPERTY OF THE CITY OF NEW YORK", and further, must not at any time move any of said materials to another off-site place of storage without the prior written consent of the Commissioner. Materials may be removed from their place of storage off the site for incorporation in the work upon approval of the Commissioner.

3. Where the materials are to be stored at the site, they must be stored at such locations as will be designated by the Commissioner and only in such quantities as, in the opinion of the Commissioner, will not interfere with the proper performance of the Work by the Contractor or by other subcontractors then engaged in performing work on the site. Such materials must not be removed from their place of storage on the site except for incorporation in the Work, without the approval of the Commissioner.

4. INSURANCE

   a. STORAGE OFF-SITE – Where the materials are stored off the site and until such time as they are incorporated in the Work, the Contractor must fully insure such materials against any and all risks of destruction, damage or loss including but not limited to fire, theft, and any other casualty or happening. The policy of insurance must be payable to the City of New York. It must be in such terms and amounts as must be approved by the Commissioner and must be placed with a company duly licensed to do business in the State of New York. The Contractor must deliver the original and one (1) copy of such policy or policies marked "Fully Paid" to the Commissioner.

   b. STORAGE ON THE SITE – Where the materials are stored at the site, the Contractor must furnish satisfactory evidence to the Commissioner that they are properly insured against loss, by endorsements or otherwise, under the policy or policies of insurance obtained by the Contractor to cover losses to materials owned or installed by the Contractor. The policy of insurance must cover fire and extended coverage against windstorm, hail, explosion and riot attending a strike, civil commotion, aircraft, vehicles and smoke.

5. All costs, charges and expenses arising out of the storage of such materials, must be paid by the Contractor and the City hereby reserves the right to retain out of any partial or final payment made under the Contract an amount sufficient to cover such costs, charges and expenses with the understanding that the City will have and may exercise any and all other remedies at law for the recovery of such cost, charges and expenses. There will be no increase in the Contract price for such costs, charges and expenses and the Contractor must not make any claim or demand for compensation therefore.

6. The Contractor must pay any and all costs of handling and delivery of materials, to the place of storage and from the place of storage to the site of the Work; and the City will have the right to retain from any partial or final payment an amount sufficient to cover the cost of such handling and delivery.

7. In the event that the whole or any part of these materials are lost, damaged, or destroyed in advance of their satisfactory incorporation in the work, the Contractor, at the Contractor's own cost, must replace such lost, damaged or destroyed materials of the same character and quality. The City will reimburse the Contractor for the cost of the replaced materials to the extent, and only to the extent, of the funds actually received by the City under the policies of insurance hereinbefore referred to. Until such time as the materials are replaced, the City will deduct from the value of the stored materials or

from any other money due under the Contract, the amount paid to the Contractor for such lost, damaged or destroyed materials.

8. Should any of the materials paid for the City hereunder be subsequently rejected or incorporated in the work in a manner or by a method not in accordance with the Contract Documents, the Contractor must remove and replace, at Contractor's own cost, such defective or improperly incorporated material with materials complying with the Contract Documents. Until such materials are replaced, the City will deduct from the value of the stored materials or from any other money due to the Contractor, the amount paid by the City for such rejected or improperly incorporated materials.

9. Payments for the cost of materials made hereunder will not be deemed to be an acceptance of such materials as being in accordance with the Contract Documents, and the Contractor always retains and must comply with the Contractor's duty to deliver to the site and properly incorporate in the work only materials which comply with the Contract Documents.

10. The Contractor must retain any and all risks in connection with the damage, destruction, or loss of the materials paid for hereunder to the time of delivery of the same to the site of the Work and their proper incorporation in the work in accordance with the Contract Documents.

11. The Contractor must comply with all laws and the regulations of any governmental body or agency pertaining to the priority purchase, allocation, and use of the materials.

12. When requesting payment for such materials, the Contractor must submit with the partial estimate duly authenticated documents of title, such as bills of sale, invoices or warehouse receipts, all in quadruplicate. The executed bills of sale must transfer title to the materials from the Contractor to the City. (In the event that the invoices state that the material has been purchased by a subcontractor, bills of sale in quadruplicate will also be required transferring title to the materials from subcontractor to the Contractor).

13. Where the Contractor, with the approval of the Commissioner, has purchased unusually large quantities of materials in order to assure their availability for the work, the Commissioner, at the Commissioner's option, may waive the requirements of Paragraph 12 provided the Contractor furnishes evidence in the form of an affidavit from the Contractor in quadruplicate, and such other proof as the Commissioner may require, that the Contractor is the sole owner of such materials and has purchased them free and clear of all liens and other encumbrances. In such event, the Contractor will pay for such materials and submit proof thereof, in the same manner as provided in Paragraph 12 hereof, within seven (7) days after receipt of payment therefore from the Comptroller. Failure on the part of the Contractor to submit satisfactory evidence that all such materials have been paid for in full, will preclude the Contractor from payments under the Contract.

14. The Contractor must include in each succeeding partial estimate requisition a summary of materials stored which must set forth the quantity and value of materials in storage, on or off the site, at the end of each preceding estimate period; the amount removed for incorporation in the Work; the quantity and value of materials delivered during the current period and the total value of materials on hand for which payment thereof will be included in the current payment estimate.

15. Upon proof to the satisfaction of the Commissioner of the actual cost of such materials and upon submission of proper proof of title as required under Paragraph 12 or Paragraph 13 hereof, payment will be made therefore to the extent of 85%, provided however, that the cost so verified, established and approved must not exceed the estimated cost of such materials included in the approved detailed breakdown estimate submitted in accordance with Article 41 of the Contract; if it does, the City will pay only 85% approved estimated cost.

16. Upon the incorporation in the Work of any such materials, which have been paid for in advance of such incorporation in accordance with the foregoing provisions, payment will be made for such materials incorporated in the Work pursuant to Article 42 of the Contract, less any sums paid pursuant to Paragraph 15 herein.

F. Transmittal: Submit one signed and notarized electronic PDF copy of each payment requisition to **Commissioner** by email or as directed.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. MOBILIZATION PAYMENT – A line item for mobilization must be allowed on the Contractor's Detailed Bid Breakdown submitted in accordance with Article 41 of the Contract. The Mobilization Payments are intended to include the cost of required bonds, insurance coverage, and/or any other expenses required for the initiation of the Contract Work. All costs for mobilization will be deemed included in the total Contract Price. The Detailed Bid Breakdown must reflect, and the Mobilization Payment will be made, in accordance with the following schedule:

Contract Bid Amount	Initial Mobilization Payment	Remaining Mobilization Payment	Total Mobilization Payment (Initial Mobilization Payment + Remaining Mobilization Payment)
$0 - $10,000,000	1% of contract bid amount	7% of contract bid amount	8% of contract amount
$10,000,001 - $50,000,000	1% of contract bid amount	7% on the first $10,000,000 plus 3% of the contract bid amount greater than $10,000,000	8% on the first $10,000,000 plus 4% of contract amount greater than $10,000,000
Over $50,000,000	$500,000	$1,900,000	$2,400,000

1. Upon issuance of the Notice to Proceed, the Contractor may requisition for the Initial Mobilization Payment upon submission and approval of all required insurance certificates and bonds.

2. The Contractor may requisition for the Remaining Mobilization Payment upon satisfactory completion of the following items:

   a. DDC approval of the Detailed Bid Breakdown per Article 41 of the Contract;

   b. Selection and DDC approval of any required field office location(s);

   c. Submission of all required insurance certificates and bond;

   d. Approval of the Site Safety Plan per the Safety Requirements Section of the Information for Bidders;

   e. Approval of the Progress Schedule;

   f. Approval of the Schedule Submittal; and,

   g. Submission of the Pre-Construction Photographs.

3. The Contractor will not be entitled to a Mobilization Payment that exceeds the Total Mobilization Payment specified in the chart above for the applicable Contract Bid Amount.

H. PAYMENT OF ALLOWANCES:

1. Unless otherwise called for in the Specifications, the following requirements apply to the payment and execution of Allowances established in the Contract:

a. Allowances are to be utilized when ordered and authorized in writing by the Commissioner.

b. The Contractor will be paid on a time and materials (T&M) basis under the Allowance, in accordance with the requirements of Standard Construction Contract Article 26.

I. Payment Requisition at Substantial Completion: Requestion for Substantial Completion Payment must be submitted in accordance with Article 44 of the Contract.

1. After Commissioner issues the Certificate of Substantial Completion, submit a payment requisition for Substantial Completion payment in compliance with Article 44 of the Contract.

2. Include documentation supporting that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

a. Complete administrative actions, submittals, and Work for Substantial Completion, as described in Section 017700 "Closeout Procedures."

3. This payment requisition must reflect any Occupation or Use Prior to Completion per Article 16 of the Standard Construction Contract.

J. Final Payment Application: After completing Project closeout requirements, submit a payment requisition for Final Acceptance payment in compliance with Article 45 of the Contract.

1.6 PAYMENTS TO M/WBE SUBCONTRACTORS

A. The Department of Design and Construction (“DDC”) is committed to supporting the growth and success of Minority and Women-owned Business Enterprises (“M/WBE”). In furtherance of this goal, DDC complies with NYC Administrative Code section 6-129, as amended. In order to support the growth and success of M/WBEs on all DDC projects, it is important that M/WBE vendors that are sub-contractors (any tiers) are treated fairly at all times and that their payment requisitions / invoices are handled in accordance with the City’s Standard Construction Contract. Pursuant to the Standard Construction Contract, prime contractors are required to pay subcontractors within thirty (30) days of receipt of such funds from DDC. Failure to comply with the Standard Construction Contract and the goals established by DDC as it applies to M/WBEs, may result in financial sanctions and negative performance evaluations, which will be taken into consideration on future procurements.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. LEED: Refer to the Addendum to identify whether this Project is designed to comply with a Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

C. COMMISSIONING: Refer to the Addendum to identify whether this Project will be commissioned by an independent third party under separate contract with the City of New York (City). Commissioning will be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS, and/ or Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE COMMISSIONING. The Contractor must cooperate with the commissioning agent and provide whatever assistance is required.

1.2 SUMMARY:

A. This Section includes administrative provisions for coordinating construction operations on the Project, including:

1. Coordination Drawings
2. Administrative and supervisory personnel
3. Project meetings
4. Requests for Interpretation (RFIs)

B. This Section includes the following:

1. Definitions
2. Coordination
3. Submittals
4. Administrative and Supervisory Personnel
5. Project Meetings
6. Requests for Interpretation (RFI’s)
7. Correspondence
8. Contractor’s Daily Reports
9. Alternate and Substitute Equipment

C. Related Sections:

1. Section 01 10 00 SUMMARY
2. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
3. Section 01 33 00 SUBMITTALS
4. Section 01 35 26 SAFETY REQUIREMENTS
5. Section 01 73 00 EXECUTION REQUIREMENTS
6. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

7. Section 01 77 00 CLOSEOUT PROCEDURES

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 COORDINATION:

A. Coordination: The Contractor must coordinate its construction operations, including those of its subcontractors, with other entities to ensure the efficient and orderly installation of each part of the Work. The Contractor must coordinate the various operations required by different Sections of the Specifications that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence in order to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum access for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and access for required maintenance, service, and repair of all components, including mechanical and electrical.

B. The Contractor must prepare memoranda for distribution to its subcontractors and other involved entities, outlining special procedures required for coordination. Such memoranda must include required notices, reports, and meeting minutes as applicable.

C. Administrative Procedures: The Contractor must coordinate scheduling and timing of required administrative procedures with other construction activities and activities of its subcontractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include without limitation the following:

1. Preparation of Contractor's Construction Schedule.
2. Installation and removal of temporary facilities and controls.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Pre-installation conferences.
6. Startup and adjustment of systems.
7. Project closeout activities.

D. Conservation: The Contractor must coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

E. Salvaged Items, Material and/or Equipment: The Specifications may identify certain items, materials or equipment which must be salvaged by the Contractor and handled or disposed of as directed. The

Contractor must comply with all directions in the Specifications regarding the salvaging and handling of identified items, material or equipment.

F. Software: The Contractor may be required by the Commissioner to utilize a designated cloud-based Construction Management Tool to streamline and manage activities, including but not limited to the following:
1. Submittals;
2. Drawings, Specifications, and Bulletins;
3. RFI's;
4. Progress Photographs;
5. Letters and Correspondence;
6. Punchlists and Closeout Management;
7. Daily Logs;
8. Meetings and Minutes; and/or,
9. Change Order log memos.

1.5 SUBMITTALS:

A. Submit shop drawings, product data, samples etc., in compliance with Section 01 33 00 SUBMITTAL PROCEDURES.

B. Coordination Drawings: The Contractor must prepare applicable Coordination Drawings in compliance with the requirements for Coordination Drawings in Section 01 33 00 SUBMITTAL PROCEDURES.

C. Safety Plan in compliance with Section 01 35 26 SAFETY REQUIREMENTS PROCEDURES.

D. Waste Management Plan in compliance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

E. Key Personnel Names: Within fifteen (15) Days after the Notice to Proceed (NTP), the Contractor must submit a list of key personnel assignments of the Contractor and its subcontractors, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in case of the absence of individuals assigned to Project.

1. Post copies of the list in Project meeting room, in temporary field office, and by each temporary telephone. Keep the list current at all times.

2. In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work. Include special personnel required for coordinating all operations by its subcontractors.

1.6 PROJECT MEETINGS:

A. General: The Resident Engineer will hold regularly scheduled construction progress meetings at the site, at which time the Contractor and appropriate subcontractors must have their representatives present to discuss all details relative to the execution of the work. The Resident Engineer will preside over these meetings.

1. Agenda: Prior to each meeting, the Resident Engineer will consult with the Contractor and will prepare an agenda of items to be discussed. In general, after informal discussion of any item on the agenda, the Resident Engineer will summarize the discussion in a brief written statement, and the Contractor will then dictate a brief statement for the record.

2. Coordination: In addition to construction progress meetings called by the Resident Engineer, the Contractor must hold regularly scheduled meetings for the purpose of coordinating, expediting and scheduling the work in accordance with the master coordinated Job Progress Chart. The Contractor and its subcontractors, material suppliers or vendors whose presence is necessary, are required to attend. These meetings may, at the discretion of the Contractor, be held at the same place and immediately following the Project meetings held by the Resident Engineer. Minutes of these meetings must be recorded, typed and printed by the Contractor and distributed to all parties concerned.

B. Preconstruction Kick-Off Meeting:

1. The Resident Engineer will schedule a preconstruction kick-off meeting either at DDC's main office or at the Project site to review responsibilities and personnel assignments and clarify the role of each participant. Unless otherwise directed, the Design Consultant will record and distribute meeting minutes.
2. Attendees: Authorized representative of the Sponsor Agency; Design Consultant; the Contractor and its superintendents, subcontractor(s) and their superintendent(s); LEED sub-consultant and Commissioning Authority /Agent (CxA) as applicable and other concerned parties. All participants at the meeting must be familiar with the Project and authorized to conclude matters relating to the Contract Work.
3. Agenda: Includes without limitation the following as applicable:
    a. Establishing construction schedule;
    b. Schedule for regular construction meetings;
    c. Phasing;
    d. Critical Work sequencing and long-lead items;
    e. Designation of key personnel and their duties;
    f. Reviewing application for payment and change order procedures;
    g. Procedures for RFIs;
    h. Review permits and approval requirements;
    i. Review all recent administrative code reporting requirements relating to the Project, (i.e. LL 77, LL86 etc.);
    j. Procedures for testing and inspecting;
    k. Reviewing special conditions at the Project site;
    l. Distribution of the Contract Documents;
    m. Submittal procedures;
    n. Safety procedures;
    o. LEED requirements;
    p. Commissioning requirements;
    q. Preparation of record documents;
    r. Historic Treatment requirements;
    s. Use of the premises;
    t. Work restrictions;
    u. Sponsor Agency occupancy requirements;
    v. Responsibility for temporary facilities, services, and controls;
    w. Construction Waste Management and Disposal;
    x. Indoor Air Quality Management Plan;

y. Dust Mitigation Plan;
z. Office, work, and storage areas;
aa. Equipment deliveries and priorities;
bb. Security;
cc. Progress cleaning; and,
dd. Working hours;

C. Construction Progress Meetings:
1. The Resident Engineer will schedule and conduct construction progress meetings at bi-weekly intervals or as otherwise determined. All participants at the meeting must be familiar with the Project and authorized to conclude matters relating to the Work. Unless otherwise directed, the Design Consultant will record and distribute meeting minutes.
2. Attendees:
a. Design Consultant and applicable sub-consultants;
b. Sponsor Agency Representative;
c. Representatives from the Contractor, sub-contractor(s), suppliers or other entities involved in the current progress, planning, coordination or future activities of the Work; and,
d. Other appropriate DDC personnel, DDC consultants and concerned parties.
3. Agenda: Includes without limitation the following:
a. Review the Construction Schedule and progress of the Work. Determine if the Work is on time, ahead of schedule or behind schedule. Determine actions to be taken to maintain or accelerate the schedule;
b. Review and approve prior meeting minutes and follow up open issues;
c. Coordinate work between each subcontractor;
d. Sequence of Operations;
e. Status of submittals, deliveries, and off-site fabrication;
f. Status of inspections and approvals by governing agencies;
g. Temporary facilities and controls;
h. Review Site Safety;
i. Quality and work standards;
j. Field observations;
k. Status of correction of deficient items;
l. RFI’s;
m. Pending changes;
n. Status of outstanding payments and change orders;
o. LEED requirements including Construction Waste Management, Indoor Air Quality Plan, Dust Mitigation and Commissioning; and,
p. Status of Administrative Code reporting requirements related to the Project.

D. Preinstallation Conferences:
1. The Contractor will conduct a preinstallation conference at project site before each construction activity when required by other specification Sections and when required for coordination with other construction.
2. Attendees:

a. Contractor and its superintendents
b. Applicable subcontractor(s)
c. Representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow.

3. Advise the Commissioner of scheduled preinstallation conference meeting dates.
4. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents
   b. Related RFI's
   c. Deliveries
   d. Submittals
   e. Review of mockups
   f. Possible conflicts
   g. Compatibility requirements
   h. Time schedules
   i. Weather limitations
   j. Manufacturer's written instructions
   k. Warranty requirements
   l. Compatibility of materials
   m. Acceptability of substrates
   n. Temporary facilities and controls
   o. Space and access limitations
   p. Testing and inspecting requirements
   q. Installation procedures
   r. Coordination with other work
   s. Required performance results
   t. Protection of adjacent work

1.7 REQUESTS FOR INFORMATION (RFI):

A. Procedure: Immediately on discovery of the need for information or interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, the Contractor must prepare and submit an RFI in the form specified by the Resident Engineer.

1. RFI must originate with the Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFI in a prompt manner to the Resident Engineer so as to avoid delays in Contractor's Work or Work of its subcontractors.
3. RFI Log: The Contractor must prepare, maintain, and submit a tabular log of RFIs organized by the RFI number monthly to the Resident Engineer, or more frequently if directed by the Resident Engineer.
4. On receipt of responses and action to the RFI, the Contractor must update the RFI log and immediately distribute the RFI response to affected parties. Review response(s) and notify the Resident Engineer immediately if the Contractor disagrees with response(s).

1.8 CORRESPONDENCE:

A. Copies of all correspondence to DDC must be sent directly to the Resident Engineer at the job site.

1.9 CONTRACTOR'S DAILY REPORTS:

A. The Contractor must prepare and submit Daily Construction Progress Reports as outlined in Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 31 00

(No Text on This Page)

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required Work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for establishing an effective base line schedule for the Project and documenting the progress of construction during performance of the Work by developing and revising as necessary, various documents including but not limited to the following:
   1. Submittals schedule
   2. Daily construction reports
   3. Material location reports
   4. Field condition reports
   5. Special reports

B. RELATED SECTIONS:

1.	Section 01 10 00	SUMMARY
2.	Section 01 32 22	PHOTOGRAPHIC DOCUMENTATION
3.	Section 01 32 16.10	PROJECT SCHEDULES (METHOD A)
4.	Section 01 32 16.20	PROJECT SCHEDULES (METHOD B)
5.	Section 01 32 16.30	PROJECT SCHEDULES (METHOD C)
6.	Section 01 33 00	SUBMITTAL PROCEDURES
7.	Section 01 40 00	QUALITY REQUIREMENTS

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

PART II – PRODUCTS

2.1 SUBMITTALS SCHEDULE:

A. Preparation: The Contractor must submit a schedule of submittals, arranged in chronological order by dates required by the construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates. The Submittals Schedule must show all of the following types of submittals:

1. Shop and Coordination Drawings
2. Material Samples
3. Catalog Cuts
4. Test and Evaluation Reports
5. Field Test Reports
6. Sample Warranties
7. Certificates
8. Qualification Data
9. Closeout Submittals

B. Submittals: At the kick-off meeting, the Contractor must have a preliminary Submittals Schedule, and must review this Schedule with the Resident Engineer and the Design Consultant. Within ten (10) Days after the kick-off meeting, the Contractor must complete the Submittals Schedule, including all submission dates, required delivery dates, and fabrication times. The Contractor must include an updated Submittals Schedule with all Progress Payment applications.

C. Review: The Resident Engineer will review the Submittals Schedule submitted by the Contractor. Upon acceptance, the Resident Engineer will date and sign the schedule as approved and transmit it to the Design Consultant, Contractor, and others within DDC as the Resident Engineer deems appropriate. If so directed by the Commissioner, the Contractor must revise the Submittals Schedule to indicate a submission date for specified shop drawings and/or material samples within sixty (60) Days after the kick-off meeting. The Contractor must resubmit the Submittals Schedule as necessary to include all review comments.

2.2 REPORTS:

A. Daily Construction Reports: The Contractor must submit to the Resident Engineer written Daily Construction Reports at the end of each day that work was performed, recording basic information such as the date, day, weather conditions, and contract days passed, remaining contract duration/days and the following information concerning the Project.

Information: The reports must be prepared by the Contractor's Superintendent and must bear the Contractor's Superintendent's signature. Each report must contain the following information:

1. List name of Contractor, subcontractors, their work force in each category, and details of activities performed;
2. The type of materials and/or major equipment being installed by the Contractor and/or by each subcontractor;
3. The major construction equipment being used by the Contractor and/or subcontractors;
4. Material and Equipment deliveries;
5. High and low temperatures and general weather conditions;
6. Accidents;
7. Meetings and significant decisions;
8. Unusual events;
9. Stoppages, delays, shortages, and losses;
10. Meter readings and similar recordings;

11. Emergency procedures;
12. Orders and/or requests of authorities having jurisdiction;
13. Approved Change Orders received and implemented;
14. Field Orders and Directives received and implemented;
15. Services connected and disconnected;
16. Equipment or system tests and startups;
17. Digital photographs (cell phone quality, 5 megapixel minimum) of the work being performed, and of any issues;
18. Partial Completion(s) and occupancies; and,
19. Substantial Completion(s) authorized;

NOTE: If there is NO ACTIVITY at site, a daily report indicating so and the reason for no activity at the site must be submitted.

B. Material Location Reports: The Contractor must submit a Material Location Report at weekly OR monthly intervals as determined and established by the Commissioner. Such report must include a comprehensive list of materials delivered to and stored at Project site. List must be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit a Request For Information (RFI) form with a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.3 SPECIAL REPORTS:

A. Accident report, incident report, special condition report for the conditions out of control of any party involved with the Project effecting Project progress, explaining impact on the Project schedule and cost if any.

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 00

(No Text on This Page)

SECTION 01 32 16.10
PROJECT SCHEDULES (METHOD A)

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 16.10

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:

1. Methods
2. Definitions
3. Preliminary, Baseline, and Project Schedule Preparation Timeline
4. Preliminary Project Schedule Development
5. Project Schedule
6. Activity and Calendar Coding Structure
7. Work Breakdown Structure (WBS)
8. Major Milestones
9. Short (Three-Week) Interval/Two-Week Look-Ahead
10. Submittals
11. Project Schedule Updating
12. Time Impact Analysis

1.3 METHODS:

A. The Contractor must comply with Project schedule development and updating requirements as specified herein.

1. The Contractor must employ or retain the services of a Construction Scheduler with verifiable construction scheduling experience, subject to review and acceptance by the City. Upon request, the Contractor must provide the City with details of qualifications and experience of the proposed scheduling staff member(s).

2. The Contractor must prepare, update, and maintain a detailed Project Schedule using a version of scheduling software that is compatible with the City's Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM). All schedule submittals must be developed using Oracle's Primavera P6 EPPM software. Schedules must be developed using accepted CPM techniques using the precedence diagramming method (PDM). The Project Schedule must be developed following Defense Contract Management Agency (DCMA) and American Association of Cost Engineering International (AACE International) guidance. The Contractor will be required to use the Contractor's

own P6 license (whether single-user or Enterprise license), unless otherwise directed by the Commissioner. If directed by the Commissioner prior to the Notice to Proceed (NTP), the Contractor must use the Department's P6 Enterprise license and develop the Progress Schedule within the Department's Enterprise environment.

3. Once the Baseline Schedule is accepted by the City, progress updates to the Project Schedule must be submitted monthly, unless otherwise directed by the City, until Substantial Completion. The Data Date for the schedule updates must use the last Friday of the month, or as directed by the City.

4. The Contractor will be responsible for providing the monthly schedule updates once the Baseline Schedule is approved. Each monthly schedule update must be accompanied with a schedule narrative that explains the following:

    a. The progress of work during that particular period of performance,
    b. Any changes in schedule Logic,
    c. The physical conditions that were used to update every Activities Percent Complete,
    d. Any change in actual Start and Finish Dates,
    e. Any Duration changes,
    f. Any added and deleted Activities, and
    g. Any added Extra Work (e.g. change orders).

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Activity	A representation of a discrete portion of the overall scope of Work or an event through Duration and description in a CPM schedule.
Baseline Schedule	The planned and detailed CPM schedule of Activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work. The Baseline Schedule must be accepted by the City.
Critical Path	The longest sequence of Activities in a network which establishes the minimum length of time for accomplishment of the end event of the Project.
Critical Path Method (CPM)	A management technique used to plan and control a Project which combines all relevant information into a single plan defining the sequence and Duration of operations and depicting the interrelationship of the Work elements required to complete the Project.
Current Schedule	The most recently updated schedule that captures progress to date and forecasts the dates for each Activity.
Data Date	The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.
Duration	The amount of time, in workdays, an Activity will take to perform.

Term	Definition
Finish Date	The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Free Float	The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship. (See Finish Date and Late Finish).
Fragnet	Fragmentary network: a portion of a schedule detailing impacts of an event on specific Activities in the broader schedule.
Inclement Weather	Any weather condition, the duration of which varies in excess of the 3-year average published by the National Oceanic and Atmospheric Administration (NOAA) information for the local area.
Integrated Project Schedule	The Commissioner's overall schedule covering design, procurement and construction. The Commissioner will use the Contractor's Project Schedule to update the Integrated Project Schedule.
Late Finish	An estimate of the latest plausible date an Activity's completion can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Late Start	An estimate of the latest plausible date an Activity's start can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Logic	A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.
Milestone	A key or critical point in time for reference or measurement.
Network Diagram	A graphic diagram of a network schedule, showing Activities and Activity relationships.
Original Duration	The estimated amount of time, in Work Days, an Activity is expected to take to complete at the beginning of a Project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Schedule.
Percent Complete	The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated as physical percent complete for payment purposes.
Project Schedule	The Contractor's schedule used to manage the orderly and expeditious completion of the Work. The Project Schedule is initially the accepted Baseline Schedule, and is updated throughout the Project.
Remaining Duration	The amount of time, in Work Days, the remaining scope of Work represented by an Activity is expected to take to complete, measured from the current Data Date.

Term	Definition
Resource and Cost Loading	Values assigned for estimated dollars, manpower, equipment and/or materials necessary to complete the scope of Work represented by a specific Activity.
Recovery Schedule	A Recovery Schedule outlining and incorporating extraordinary efforts required to recover lost time with the aim of achieving completion of the Project within the stipulated contract Duration, plus authorized time extensions. In such case, special attention must be given to minimize delays as much as possible and must establish the nature of efforts; for instance, resources and equipment required, extended hours of work, weekend work, accelerated fabrication, required action(s) or effort(s) by the Contractor, its subcontractors, consultants, clients, end users and/or other concerned parties to recover the schedule.
Revised and/or Updated Schedule	A Baseline Schedule, Progress Project Schedule, or Recovery Schedule for the Project that shows the actual Duration of all the completed Activities, including Duration of and the reasons for delays, if any has occurred, AND revisions to all remaining Activities of the Contractor and its subcontractors, including changes, if any, to logical ties, interrelations and the sequence of each of the outlined Activities. Any such revisions should be shown on the row just below the approved schedule of the respective Activity so that revisions can be compared. The Revised and/or updated Schedule must be reviewed and approved by the City.
Start Date	The earliest estimated date an Activity is calculated to begin, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Time Impact Analysis	A forward looking (prospective) schedule analysis used to forecast the impact to the Critical Path and to Milestone Finish Dates caused by a single event or series of events. Time Impact Analysis is not a retrospective (forensic) schedule analysis or a what-if schedule analysis of a potential event.
Total Float	The amount of time the start or finish of an Activity can be delayed without affecting the Project completion date.
Work Breakdown Structure (WBS)	WBS is a deliverable-oriented decomposition of a Project into smaller components. A WBS provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.
Work Days (WD)	Work Days are every consecutive day in the calendar, excluding weekends (Saturday and Sunday) and holidays.

1.5 PRELIMINARY, BASELINE, AND PROJECT SCHEDULE PREPARATION TIMELINE:

A. Upon receipt of the NTP, the Contractor must promptly prepare a preliminary Project Schedule and subsequently a Baseline Schedule and must submit for the City's acceptance as follows:

1. The preliminary Project Schedule must be submitted no later than fifteen (15) Days after NTP.
2. The initial submittal of the Baseline Schedule must be provided to the City for review no later than thirty (30) Days after NTP.

3. The Contractor must incorporate all corrections and revisions required by the City and provide an updated version of the Baseline Schedule for review and acceptance no later than sixty (60) Days after NTP to ensure that the Baseline Schedule is accepted. The sixty (60) Days must include fourteen (14) Days review times for each submittal of the Baseline Schedule.
4. Once accepted, the Baseline Schedule will be the basis of Project Schedule updates.

1.6 PRELIMINARY PROJECT SCHEDULE DEVELOPMENT:

A. The preliminary Project Schedule must be a detailed plan (division level per Construction Specifications Institute (CSI) MasterFormat) of all operations, including submittals, permitting, testing, and construction Activities, for either the first ninety (90) Days after NTP or to the point where the Contractor plans to mobilize on site (whichever is greater). This submittal will also depict a summary level (section level per CSI MasterFormat) schedule of the major Activities for the remainder of the Work.

1. All Activities for Contractor mobilization, procurement, and construction Activities within the first sixty (60) Days, including permits and submittals. All remaining work forecasted after the first sixty (60) Days must be summarized through the Contract's completion date.
2. All submittal and procurement Activities for long lead items.
3. The Project's Critical Path.
4. An electronic copy of the schedule in either MS Project (.MPP) or Primavera P6 Professional Format (.XER).

B. The preliminary Project Schedule will be reviewed by the City and returned with comments, as necessary, within fourteen (14) Days of submittal receipt. Information from the preliminary Project Schedule will be the general foundation for development of the Baseline Schedule.

1.7 PROJECT SCHEDULE:

A. The Baseline Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

B. After the Baseline Schedule is approved, the Project Schedule must be the Contractor's working schedule and must be used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete the Work.

C. The Project Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

D. The Project Schedule must be the Contractor's working schedule used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all remaining Work.

E. All delay claims must be based on the current approved updates of the Project Schedule.

F. The Contractor must confirm in writing that all subcontractors performing any portion of the Work are in agreement with the accepted Baseline Schedule and the monthly updates.

G. The amount of detail represented in the Baseline and Project Schedule and supporting documents submitted must, at a minimum, include the following items:

1. Contract Milestones must be identified and included in the Baseline and Project Schedule.
2. All submittal, owner review & approval, purchase, manufacture, and delivery Activities for all major materials and equipment.
3. Deliveries of owner-furnished equipment and/or materials.
4. Preparation, submittal, and approval of drawings, material samples, and safety plans.
5. Preparation, submittal, review, and approval of permits required by all regulatory agencies and other third parties.
6. Performance of tests, submission of test reports, and approval of test results.
7. Commissioning Activities for all commissioned systems and equipment is to be clearly delineated and scheduled such that they will be completed prior to Substantial Completion. Such Activities must include, at a minimum, Pre-Functional testing and check sheets; Testing, Adjusting, and Balancing (TAB) verification; Functional Testing, including testing of all controls; and Owner's demonstration and orientation.
8. Completion dates of all items required for phased completion (if applicable).
9. Completion dates of all items required for Substantial Completion.
10. Completion dates of all items required to obtain a Temporary Certificate of Occupancy (TCO) and Certificate of Occupancy (CO).
11. Completion dates for close-out of regulatory and punch list items prior to Final Acceptance and transfer of the Project.
12. Any additional detail requested by the Commissioner.

H. Activities identified in the Baseline and Project Schedule must have the Duration in units of whole Work Days. Construction Activity Durations must not exceed twenty (20) Work Days unless specifically approved by the City. This is to ensure that Activities are not generalized and that each Activity and sub-Activity are defined as narrowly as reasonable to facilitate schedule tracking. Durations for non-construction Activities such as procurement of materials, delivery of equipment, concrete curing, etc., may exceed twenty (20) Work Days without prior approval; however, these are still subject to review by the City. Durations must be based on the available resources required for performing each Activity and must be the result of definitive labor hours using established production rates, and with consideration of on-site working conditions. If requested by the City, the Contractor must justify the reasonableness of a planned Duration.

I. Activity descriptions must use plain language that clearly and uniquely defines each Activity. Each description must include a verb or work function (e.g. submit, form, pour, etc.), an object (e.g. slab, foundation, etc.) and, for any construction Activities, a specific location. The Work related to each Activity must be limited to one responsibility and one trade.

J. Activity relationships must be assigned to clearly establish predecessor and successor relationships to each Activity. Open-ended Activities are not permitted with the exception of the first and last Activity in the network, the first Activity being NTP and the last being Final Acceptance. The use of relationship lag times is discouraged and only permitted with prior approval by the City. The use of negative lag is never permitted.

K. Activity constraint dates are only to be used to reflect contractual constraints unless specifically authorized by the City.

L. Float or slack, in any schedule, must not be for the exclusive use or benefit of either the City or the Contractor, but must be available for use by both the City and the Contractor.

M. Each resubmittal after the Project Schedule is delivered for acceptance must comply with all requirements of this section. Review and response by the City will be given within fourteen (14) Days after resubmission. The Contractor's receipt of the comments within the time specified must not, in any way, affect the Contractor's responsibility to complete the Project within the time fixed in Schedule A.

N. Failure by the City to return comments or indicate acceptance status will in no way relieve the Contractor's obligation to submit monthly schedule updates.

O. At the request of the City, the Contractor must be required to make a presentation to explain or clarify the intended logical sequence of construction Activities depicted in the detailed Project Schedule. The Contractor and designated scheduler must discuss anticipated challenges and outline construction methodology and flow of work to show how and when major Milestones will be achieved. In addition, the Contractor may, at no cost to the City, be required to participate in additional Project meetings necessary to obtain acceptance of the above-noted submittals.

1.8 ACTIVITY AND CALENDAR CODING STRUCTURE:

A. The Baseline and Project Schedules must contain a sufficient number of Activities to represent adequate planning and execution of the Work so that it shows an accurate flow of work and demonstrates an understanding of the Project by the Contractor.

B. Activity ID and Calendar Coding

1. The Contractor's proposed Activity and calendar coding and must be submitted with the preliminary Project Schedule. A meeting may be requested by the City to discuss the scheme and other schedule information prior to the submittal of the Project Schedule. The accepted coding scheme and WBS Structure must be incorporated into the Project Schedule.

C. Activity ID Coding

1. All Activities/ Resources/ Calendars (Baseline and Project Schedules) must be coded inside the P6 Project Environment / Project Level (NOT the Global Environment/ Enterprise Level) to facilitate selection, sorting and preparation of reports.

2. Activity coding must consist of the Project ID followed by a dash, followed by Activity coding (PROJECT ID-ACTIVITY CODE). Activity codes must be created at the Project level and must utilize the coding scheme outlined in the table below:

Activity Code	Meaning
RESP	Responsibility: Identify the party (e.g. Contractor, subcontractor, City, etc.) responsible for the Activity.
PHAS	Phase: Breakdown of Activities in Milestones, pre-construction, procurement, construction and close-out Activities.
LOCN	Location: Breakdown by floor or elevation.
AREA	Area: Breakdown by room, area, block or wing. May be used as a subdivision of PHAS to include Milestones, permits, subcontractor approvals, submittals, fabrication and delivery, and subdivision of the Site and buildings into Logical modules, such as by blocks, wings, etc.
TRAD	Trade: Breakdown by CSI Code or section number in the Specifications.

a. Description of schedule Activities must include terminology that represents the scope of work associated with that particular Activity. Terminology used to describe similar actions must be consistent across all segments of work.

b. Naming convention for schedule Activities must be descriptive and indicate the associated work covered by the Activity. Activities must use a verb, noun, and location of the work in the Activity name.

3. Project Calendar Coding

   a. All calendars created and assigned to Activities must be Project-level calendars. The Calendar Name must consist of the Project ID number followed by a dash, followed by a descriptive Calendar Name (PROJECT ID-CALENDAR NAME).

1.9 WORK BREAKDOWN STRUCTURE:

A. Structure must be submitted with the preliminary Project Schedule. The levels (nodes) must include, but not be limited to:

   1. LEVEL 01 – The Project Level.

   2. LEVEL 02 – Contains a minimum of four (4) nodes: Pre-Construction, Procurement, Construction or Phase of Construction, and Closeout.

   3. LEVEL 03 – Decomposition of each of the four (4) nodes in Level 02 into its constituent parts. This level must target specific, tangible, deliverable scopes of Project Work.

B. The Contractor's proposed WBS must be submitted with the preliminary Project Schedule. The accepted WBS Structure must be incorporated into the Baseline and Project Schedule.

1.10 MAJOR MILESTONES:

A. The schedule must include both contractual and non-contractual Milestones that are provided by the City. These Milestones must be properly associated with the related Work and maintained to represent the progress of the Project.

1.11 SHORT (THREE-WEEK) INTERVAL / TWO-WEEK LOOK-AHEAD:

A. On a bi-weekly basis, the Contractor must provide a three (3) week short interval schedule in a format satisfactory to the City. The purpose of this schedule is to report the actual progress of the past week against the previous short interval look-ahead Activities and add any additional Activities planned for the next two (2) weeks. Electronic files and hard copies must be provided to the City on the first day of each work week with the prior week's actual progress included.

B. Each task listed on the short interval schedule must be representative of the most current Project Schedule Update and include a reference to an Activity shown on the current update.

C. The short interval schedule must list all required DDC coordinated activities, including special inspections.

1.12 SUBMITTALS:

A. General

   1. Development of the Baseline Schedule and updating of the Project Schedule must follow the DCMA and AACE International guidelines.

   2. Each electronic submission of the Project Schedule must be assigned a unique file name consisting of the Project ID (as noted on the NTP followed by a dash followed by a unique file name clearly marked (i.e. ProjID- B000 = B/L rev0, ProjID-B001 = B/L rev01 etc.) to indicate the specific submission. Similarly, update submittals must be named ProjID-Uxxx where xxx is a sequential number, starting with 001, indicating the revision or issue number.

3. The Contractor must provide all submittals in electronic format and two hard copies.

B. Preliminary Project Schedule

1. For acceptance of the preliminary Project Schedule, the Contractor must submit the following:

a. Two (2) 11" x 17" hard copies of the proposed preliminary Project Schedule, as well as the native electronic schedule data file, in .XER file format, per the direction of the City.

b. A Schedule Narrative Report detailing the Contractor's initial plan for executing the Contract work within the allotted Contract Duration, and include the following explanation of their provided preliminary schedule:

i. The proposed WBS;
ii. All proposed Project Calendars;
iii. All proposed Activity Codes, clearly defined;
iv. The proposed Activity ID format; and
v. Schedule basis narrative, which must memorialize assumptions made in the development of the schedule.

C. Baseline Schedule

1. The City will normally return comments within ten (10) Work Days after receipt of the initial Project Schedule Submission. If any of the required submissions are returned to the Contractor for corrections or revisions, they must be resubmitted within five (5) Work Days from receipt of comments. Each resubmittal must comply with the requirements enumerated above. Review and response by the City will be given within ten (10) Work Days after resubmission.

2. At the request of the City, the Contractor will be required to participate in Project meetings necessary to obtain an acceptance of the above noted submittals.

3. Baseline Schedule submittal must contain a Narrative Report. It must include the following, or as directed by the City:

a. A description of the Project scope and how the Work is represented in the schedule Activities;

b. A description of the overall sequence of major components of Work;

c. Planned work week for each definable feature of work;

d. Description of the Critical Path and near Critical Paths;

e. How weather will be accommodated in the schedule, including a description of the weather calendar and the Activities it is applied to, and the NOAA Inclement Weather data that defined the number of non-work days;

f. How regulatory, operational or third-party constraints are accommodated in the schedule;

g. Description of key Project coordination points or events;

h. Discussion of long lead items and basis of time frames for submittals; and

i. Potential opportunities and risks, including quantification of the schedule reduction or expansion.

D. Project Schedule Updates

1. Every schedule submittal must be provided with a corresponding narrative. These schedule submittals and narratives are to be submitted in hard copy, as well as in the native electronic

format, as attachments to emails or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files (P6 (.XER) for Primavera and MS Word and/or Adobe Acrobat for Narrative and supporting document submittals).

2. For each submittal of the updated Project Schedule, the following layouts, reports, and graphics are required in the specified formats, unless otherwise directed by the City:

   a. The Contractor must furnish two (2) 11” x 17” color hard copies of the complete progress schedule with each initial schedule update and final update incorporating comments furnished by the City. Additionally, the Contractor must provide the native electronic schedule data file, in .XER file format with the initial and final schedule update submission.

   b. An Activity bar chart Layout grouped by Activity Code and then sorted by Start Date, Finish Date, and then Total Float.

   c. Each Activity line must display the Activity ID (Act ID), Description (Name), Original Duration (OD), Remaining Duration (RD), Start Date (ES), Finish Date (EF), and Total Float (TF), Baseline Original Duration (BL OD) Baseline Start (BL Start), Baseline Finish (BL Fin), Baseline Total Float (BL TF).

   d. An Activities progress bar must show both current progress update ES and EF, and baseline ES and EF. The top line of the bar chart area must contain the updated ES and EF; the second line below must depict the accepted baseline ES and EF dates.

3. The City may request additional standard P6 reports from time to time at no additional cost.

4. The Monthly Update submittal must contain a Narrative Report. It must include the following, or as directed by the City:

   a. Any changes to the schedule basis narrative;

   b. Overall health of the Project;

   c. Actual Activity Start Dates;

   d. Actual Activity Finish Dates;

   e. The physical conditions that were used to update Activities percent complete;

   f. Percent of Work reported in place;

   g. A description of the overall sequence of major components of Work;

   h. Description of the Critical Path and near Critical Paths;

   i. Description of key Project coordination points or events;

   j. Discussion of long lead items and basis of time frames for submittals;

   k. Potential opportunities and risks, including quantification of the schedule reduction or expansion;

   l. Assumptions/exclusions made in the schedule;

   m. Contract and Milestone completion date status:

      i. Number of Days ahead or behind schedule and; and

      ii. Days lost/gained compared with the previous update.

   n. Lookahead report listing each Activity in the CPM schedule that is scheduled to be performed during the next reporting period;

o. Changes in Activity description, Logic, or Duration must be submitted as a separate Proposed Schedule and approved by the City prior to being submitted as an official update. Once allowed, said changes must be grouped and organized in the report in a manner that communicates in detail the rationale associated with each change and the impact upon construction sequence, relationships and the Critical Path. A standard Digger Report is not sufficient to meet this requirement;

p. Added/deleted Activities and the rationale associated with each action;

q. Pending issues and status of other items;

r. Permits, in a tabular format, showing the status and change in status of all permits;

s. Contract modifications; and

t. Extra Work, including change orders.

1.13 PROJECT SCHEDULE UPDATING:

A. The initial updating must take place immediately after the City accepts the Contractor's Baseline Schedule. The Data Date for the first update must not exceed seven (7) Days from the date of receipt of the accepted Baseline Schedule, or as directed by the City.

B. Subsequent updates of the Project Schedule must be submitted monthly until Substantial Completion. The schedule Data Date must be the last Work Day of the period unless otherwise directed by the City. Updates must be provided to the City no later than seven (7) Days after the 'schedule Data Date'.

C. Updates must reflect actual or reasonably anticipated progress as of the last Work Day of the period.

D. The City may request meetings with the Contractor to review the Project Schedule and narrative and jointly verify Project health and information.

E. In addition, the City may request meetings with the Contractor's scheduling representative to:

1. Resolve out-of-sequence Logic.

2. Should out-of-sequence progress occur where Activities have reported progress without predecessor Activities being completed, the Contractor must obtain the City's approval in a Proposed Schedule before revising the Logic ties to reflect the way the Work is actually being performed. Use of progress override by default mechanisms that may be included in CPM scheduling software systems will not be allowed except on a case-by-case basis with the approval of the City. A written explanation for each instance must be included in the monthly submittal narrative.

3. Assess the impact, if any, of any pending change orders.

4. Incorporate accepted time extensions.

5. Review revised Logic (as-built and projected) and changes in Activity Duration, cost, and labor hours assigned.

F. Contractor's failure to provide required scheduling information within the required timeframe or to adhere to the currently accepted schedule may result in rejection of all or a portion of the progress payment until such time as the required schedule information is submitted and accepted by the City.

G. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the Critical Path have occurred due to action or inaction of the Contractor, and as a result the date for Substantial Completion will not be met, the Contractor must promptly take some or all of the following actions at no additional cost to the City, unless otherwise directed by the City:

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.
2. Increase the number of working hours per shift, shifts per day, or Work Days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.
3. Reschedule Activities to achieve maximum practical concurrence of accomplishment of Activities and comply with the revised schedule.
4. Submit to the City for review a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule.
5. Add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical or non-critical Activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

H. The City may, at any time during the Project and at no additional cost to the City, require the Contractor to develop a more detailed schedule/ Fragnet than depicted in the Baseline Schedule to provide a clearer understanding of the effort needed to complete an Activity or group of Activities.

I. If the City determines that either the Critical Path is in the negative by four (4) weeks, or that the Project's date for completion may be affected, the Contractor may be required, at no additional cost to the City, to prepare a Recovery Schedule. Such Recovery Schedule is subject to review and acceptance by the City. The Recovery Schedule must propose alternative methods, overtime, and other means available to the Contractor to recover the delays incurred to date.

J. The Contractor must submit an "As-Built Schedule", as the last schedule update showing all Activities, with the exception of punch list and closeout tasks, at Substantial Completion. This schedule must reflect the exact manner in which the Project was actually constructed.

1.14 TIME IMPACT ANALYSIS:

A. In addition to the requirements of the Standard Construction Contract Article 11, the Contractor must submit a Time Impact Analysis to the Engineer with all requests for time extension.

B. The Time Impact Analysis must include a written narrative and supporting impact schedule Fragnet detailing the Project delays resulting from the alleged delay. The impact schedule Fragnet, separate and distinct from the Progress Schedule update, must demonstrate that the changes or anticipated delays affect Activities of the current accepted Progress Schedule. The impact schedule will be incorporated into the Progress Schedule only after it is accepted by the Commissioner and a time extension is approved. The Fragnet submitted as part of the Time Impact Analysis must illustrate the impact of these changes or delays on the date for Substantial Completion.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 16.10

SECTION 01 32 16.20
PROJECT SCHEDULES (METHOD B)

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 16.20

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:
   1. Methods
   2. Definitions
   3. Preliminary, Baseline, and Project Schedule Preparation Timeline
   4. Preliminary Project Schedule Development
   5. Project Schedule
   6. Activity and Calendar Coding Structure
   7. Work Breakdown Structure (WBS)
   8. Major Milestones
   9. Short (Three-Week) Interval/Two-Week Look-Ahead
   10. Submittals
   11. Project Schedule Updating
   12. Time Impact Analysis

1.3 METHODS:

A. The Contractor must comply with Project schedule development and updating requirements as specified herein.

   1. The Contractor must employ or retain the services of a Construction Scheduler with verifiable construction scheduling experience, subject to review and acceptance by the City. Upon request, the Contractor must provide the City with qualifications and experience of the proposed scheduling staff member(s).

   2. The Contractor must prepare, update, and maintain a detailed Project Schedule using a version of scheduling software that is compatible with the City's Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM). All schedule submittals must be developed using Oracle's Primavera P6 EPPM software. Schedules must be developed using accepted CPM techniques using the Precedence Diagramming Method (PDM). The Project Schedule must be developed following Defense Contract Management Agency (DCMA) and American Association of Cost Engineering International (AACE International) guidance. The Contractor will be required to use

the Contractor's own P6 license (whether single-user or Enterprise license), unless otherwise directed by the Commissioner. If directed by the Commissioner prior to the Notice to Proceed (NTP), the Contractor must use the Department's P6 Enterprise license and develop the Progress Schedule within the Department's Enterprise environment.

3. Once the Baseline Schedule is accepted by the City, progress updates to the Project Schedule must be submitted monthly, unless otherwise directed by the City, until Substantial Completion. The Data Date for the schedule updates must use the last Friday of the month, or as directed by the City.

4. The Contractor will be responsible for providing the monthly schedule updates once the Baseline Schedule is approved. Each monthly schedule update must be accompanied with a schedule narrative that explains the following:

   a) The progress of work during that particular period of performance;
   b) Any changes in schedule Logic;
   c) The physical conditions that were used to update every Activities Percent Complete;
   d) Any change in actual Start and Finish Dates;
   e) Any Duration changes;
   f) Any added and deleted Activities; and,
   g) Any added Extra Work (e.g., change orders).

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Activity	A representation of a discrete portion of the overall scope of Work or an event through Duration and description in a CPM schedule.
Baseline Schedule	The planned and detailed CPM schedule of Activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work. The Baseline Schedule must be accepted by the City.
Critical Path	The longest sequence of Activities in a network which establishes the minimum length of time for accomplishment of the end event of the Project.
Critical Path Method (CPM)	A management technique used to plan and control a Project which combines all relevant information into a single plan defining the sequence and Duration of operations and depicting the interrelationship of the Work elements required to complete the Project.
Current Schedule	The most recently updated schedule that captures progress to date and forecasts the dates for each Activity.
Data Date	The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.
Duration	The amount of time, in workdays, an Activity will take to perform.

Term	Definition
Finish Date	The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Free Float	The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship. (See Finish Date and Late Finish).
Fragnet	Fragmentary network: a portion of a schedule detailing impacts of an event on specific Activities in the broader schedule.
Inclement Weather	Any weather condition, the duration of which varies in excess of the 3-year average published by the National Oceanic and Atmospheric Administration (NOAA) information for the local area.
Integrated Project Schedule	The Commissioner's overall schedule covering design, procurement, and construction. The Commissioner will use the Contractor's Project Schedule to update the Integrated Project Schedule.
Late Finish	An estimate of the latest plausible date an Activity's completion can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Late Start	An estimate of the latest plausible date an Activity's start can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Logic	A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.
Milestone	A key or critical point in time for reference or measurement.
Network Diagram	A graphic diagram of a network schedule, showing Activities and Activity relationships.
Original Duration	The estimated amount of time, in Work Days, an Activity is expected to take to complete at the beginning of a Project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Schedule.
Percent Complete	The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated as physical percent complete for payment purposes.
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Revised and/or Updated Schedule	A Baseline Schedule, Project Schedule, or Recovery Schedule for the Project that shows the actual Duration of all the completed Activities, including Duration of and the reasons for delays, if any have occurred, AND revisions to all remaining Activities of the Contractor and its subcontractors, including changes, if any, to logical ties, interrelations and the sequence of each of the outlined Activities. Any such revisions should be shown on the row just below the approved schedule of the respective Activity so that revisions can be compared. The Revised and/or updated Schedule must be reviewed and approved by the City.
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Work Breakdown Structure (WBS)	WBS is a deliverable-oriented decomposition of a Project into smaller components. A WBS provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.
Work Days (WD)	Work Days are every consecutive day on the calendar, excluding weekends (Saturday and Sunday) and holidays.

1.5 PRELIMINARY, BASELINE, AND PROJECT SCHEDULE PREPARATION TIMELINE:

A. Upon receipt of the NTP, the Contractor must promptly prepare a preliminary Project Schedule and subsequently a Baseline Schedule and must submit for the City's acceptance as follows:

1. Submit the Contractor's CPM Scheduler's qualifications to the City for approval within seven (7) Days after NTP. The City will respond to the submittal within seven (7) Days of the submittal receipt.
2. The preliminary Project Schedule must be submitted no later than twenty-one (21) Days after NTP.
3. The initial submittal of the Baseline Schedule must be provided to the City for review no later than forty-five (45) Days after NTP.
4. The Contractor must incorporate all corrections and revisions required by the City and provide an updated version of the Baseline Schedule for review and acceptance no later than seventy-five (75) Days after NTP to ensure that the Baseline Schedule is accepted no later than ninety (90) Days after the NTP. The ninety (90) Days must include fourteen (14) Days review time by the City for each submittal of the Baseline Schedule.
5. Once accepted, the Baseline Schedule will be the basis of Project Schedule updates.

B. Remedies

1. Preliminary Project Schedule: The City will take a credit of three thousand dollars ($3,000) if the preliminary Project Schedule is not submitted within twenty-one (21) Days of the NTP.
2. Acceptable Baseline Schedule: The City will take a credit of five thousand dollars ($5,000) if an acceptable Baseline Schedule is not submitted within ninety (90) Days of the NTP.
3. Monthly Progress Schedule updates: The City will take a credit of two thousand dollars ($2,000) for each schedule update not submitted within the period it was due.
4. Scheduling Firm Services: If an acceptable Baseline Schedule is not provided by the Contractor within ninety (90) Days of the NTP or three (3) updates are not provided by the Contractor during the period they are due, the City may engage the services of a scheduling firm to develop a Project schedule or update an existing schedule. The total cost of such services will be deducted from the monies due to the Contractor.
    a. Any schedules and updates developed by such scheduling firm are for the City's sole use and do not, in any way, represent an acceptance of responsibility by the City to schedule the Work or relieve the Contractor of the obligation to complete the Work within the Durations specified by the Contract.
5. The City will only accept the submitted information after all corrections have been made and all issues have been resolved. The City may find the Contractor in default if items required by this Section are incomplete.

1.6 PRELIMINARY PROJECT SCHEDULE DEVELOPMENT:

A. The preliminary Project Schedule must be a detailed plan (division level per Construction Specifications Institute (CSI) MasterFormat) of all operations, including submittals, permitting, testing, and construction Activities, for either the first ninety (90) Days after NTP or to the point where the Contractor plans to mobilize on site (whichever is greater). This submittal will also depict a summary level (section level per CSI MasterFormat) schedule of the major Activities for the remainder of the Work.

B. The preliminary Project Schedule will be reviewed by the City and returned with comments, as necessary, within fourteen (14) Days of submittal receipt. Information from the preliminary Project Schedule will be the general foundation for development of the Baseline Schedule.

1.7 PROJECT SCHEDULE:

A. The Baseline Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

B. After the Baseline Schedule is approved, the Project Schedule must be the Contractor's working schedule and must be used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all of the Work.

C. The Project Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

D. The Project Schedule must be the Contractor's working schedule used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all remaining Work.

E. All delay claims must be based on the current approved updates of the Project Schedule.

F. The Contractor must confirm in writing that all subcontractors performing any portion of the Work are in agreement with the accepted Baseline Schedule and the monthly updates.

G. The amount of detail represented in the Baseline and Project Schedule and supporting documents submitted must, at a minimum, include the following items :

1. Contract Milestones must be identified and included in the Baseline and Project Schedule.
2. All submittal, owner review & approval, purchase, manufacture, and delivery Activities for all major materials and equipment.
3. Deliveries of owner-furnished equipment and/or materials.
4. Preparation, submittal, and approval of drawings, material samples, and safety plans.
5. Preparation, submittal, review, and approval of permits required by all regulatory agencies and other third parties.
6. Performance of tests, submission of test reports, and approval of test results.
7. Commissioning Activities for all commissioned systems and equipment is to be clearly delineated and scheduled such that they will be completed prior to Substantial Completion. Such Activities must include, at a minimum, Pre-Functional testing and check sheets; Testing, Adjusting, and Balancing (TAB) verification; Functional Testing, including testing of all controls; and Owner's demonstration and orientation.
8. Completion dates of all items required for phased completion (if applicable).
9. Completion dates of all items required for Substantial Completion.
10. Completion dates of all items required to obtain a Temporary Certificate of Occupancy (TCO) and Certificate of Occupancy (CO).
11. Completion dates for close-out of regulatory and punch list items prior to Final Acceptance and transfer of the Project.
12. Any additional detail requested by the Commissioner.

H. Activities identified in the Baseline and Project Schedule must have the Duration in units of whole Work Days. Construction Activity Durations must not exceed twenty (20) work days unless specifically approved by the City. This is to ensure that Activities are not generalized and that each Activity and sub-Activity are defined as narrowly as reasonable to facilitate schedule tracking. Durations for non-construction Activities such as procurement of materials, delivery of equipment, concrete curing, etc., may exceed twenty (20) work days without prior approval; however, these are still subject to review by the City. Durations must be based on the available resources required for performing each Activity and must be the result of definitive labor hours using established production rates, and with consideration of on-site working conditions. If requested by the City, the Contractor must justify the reasonableness of a planned Duration.

I. Activity descriptions must use plain language that clearly and uniquely define each Activity. Each description must include a verb or work function (e.g. submit, form, pour etc.) an object (e.g. slab, foundation, etc.) and, for any construction Activities, a specific location. The Work related to each Activity must be limited to one responsibility and one trade.

J. Activity relationships must be assigned to clearly establish predecessor and successor relationships to each Activity. Open-ended Activities are not permitted with the exception of the first and last Activities in the network, the first Activity being NTP and the last being Final Acceptance. The use of relationship lag times is discouraged and only permitted with prior approval by the City. The use of negative lag is never permitted.

K. Activity constraint dates are only to be used to reflect contractual constraints unless specifically authorized by the City.

L. Float or slack in any schedule must not be for the exclusive use or benefit of either the City or the Contractor, but must be available for use by both the City and the Contractor.

M. Each resubmittal after the Project Schedule is delivered for acceptance must comply with all requirements of this section. Review and response by the City will be given within fourteen (14) Days after resubmission. The Contractor's receipt of the comments within the time specified must not in any way affect the Contractor's responsibility to complete the Project within the time fixed in Schedule A.

N. Failure by the City to return comments or indicate acceptance status will in no way relieve the Contractor's obligation to submit monthly schedule updates.

O. At the request of the City, the Contractor must be required to make a presentation to explain or clarify the intended logical sequence of construction Activities depicted in the detailed Project Schedule. The Contractor and designated scheduler must discuss anticipated challenges and outline construction methodology and flow of work to show how and when major Milestones will be achieved. In addition, the Contractor may, at no cost to the City, be required to participate in additional Project meetings necessary to obtain acceptance of the above noted submittals.

1.8 ACTIVITY AND CALENDAR CODING STRUCTURE:

A. The Baseline and Project Schedules must contain a sufficient number of Activities to represent adequate planning and execution of the Work so that it shows an accurate flow of work and demonstrates an understanding of the Project by the Contractor.

B. Activity ID and Calendar Coding

1. The Contractor's proposed Activity and calendar coding and must be submitted with the preliminary Project Schedule. A meeting may be requested by the City to discuss the scheme and other schedule information prior to the submittal of the Project Schedule. The accepted coding scheme and WBS Structure must be incorporated into the Project Schedule.

C. Activity ID Coding

1. All Activities/Resources/Calendars (Baseline and Project Schedules) must be coded inside the P6 Project Environment / Project Level (NOT the Global Environment/Enterprise Level) to facilitate selection, sorting and preparation of reports.

2. Activity coding must consist of the Project ID followed by a dash, followed by Activity coding (PROJECT ID-ACTIVITY CODE). Activity codes must be created at the Project level and must utilize the coding scheme outlined in the table below:

Activity Code	Meaning
RESP	Responsibility: Identify the party (e.g. Contractor, subcontractor, City, etc.) responsible for the Activity.
PHAS	Phase: Breakdown of Activities in Milestones, pre-construction, procurement, construction and close-out Activities.
LOCN	Location: Breakdown by floor or elevation.
AREA	Area: Breakdown by room, area, block or wing. May be used as a subdivision of PHAS to include Milestones, permits, subcontractor approvals, submittals, fabrication and delivery, and subdivision of the Site and buildings into Logical modules, such as by blocks, wings, etc.
TRAD	Trade: Breakdown by CSI Code or section number in the Specifications.

a. Description of schedule Activities must include terminology that represents the scope of work associated with that particular Activity. Terminology used to describe similar actions must be consistent across all segments of work.

b. Naming convention for schedule Activities must be descriptive and indicate the associated work covered by the Activity. Activities must use a verb, noun, and location of the work in the Activity name.

3. Project Calendar Coding

a. All calendars created and assigned to Activities must be Project-level calendars. The Calendar Name must consist of the Project ID number followed by a dash, followed by a descriptive Calendar Name (PROJECT ID-CALENDAR NAME).

1.9 WORK BREAKDOWN STRUCTURE:

A. A multi-level hierarchal WBS must be incorporated in all P6 schedules. An initial, proposed WBS must be submitted with the preliminary Project Schedule. The levels (nodes) must include, but not be limited to:

1. LEVEL 01 – The Project Level.
2. LEVEL 02 – Contains a minimum of four (4) nodes; Pre-Construction, Procurement, Construction or Phase of Construction, and Closeout.
3. LEVEL 03 – Decomposition of each of the four (4) nodes in Level 02 into its constituent parts. This level must target specific, tangible, deliverable scopes of the Project Work.

B. The Contractor's proposed WBS must be submitted with the preliminary Project Schedule. The accepted WBS must be incorporated into the Baseline and Project Schedule.

1.10 MAJOR MILESTONES:

A. The schedule must include both contractual and non-contractual Milestones that are provided by the City. These Milestones must be properly associated with the related Work packages and maintained to represent the progress of the Project.

1.11 SHORT (THREE-WEEK) INTERVAL / TWO-WEEK LOOK-AHEAD:

A. On a bi-weekly basis, the Contractor must provide a three (3) week short interval schedule in a format satisfactory to the City. The purpose of this schedule is to report the actual progress of the past week against the previous short interval look-ahead Activities and add any additional Activities planned for the next two (2) weeks. Electronic files and hard copies must be provided to the City on the first day of each work week with the prior week's actual progress included.

B. Each Task listed on the short interval schedule must be representative of the most current Project Schedule Update and include a reference to an Activity shown on the current update.

C. The short interval schedule must list all required DDC coordinated activities, including special inspections.

1.12 SUBMITTALS:

A. General

1. Development of the Baseline Schedule and updating of the Project Schedule must follow the DCMA and AACE International guidelines.

2. Each electronic submission of the Project Schedule must be assigned a unique file name consisting of the Project ID (as noted on the NTP followed by a dash followed by a unique file name clearly marked (i.e. ProjID- B000 = B/L rev0, ProjID-B001 = B/L rev01 etc.) to indicate the specific submission. Similarly, update submittals must be named ProjID-Uxxx where xxx is a sequential number, starting with 001, indicating the revision or issue number.

3. The Contractor must provide all submittals in electronic format and two hard copies.

B. Preliminary Project Schedule

1. For acceptance of the preliminary Project Schedule the Contractor must submit the following:

a. Two (2) 11" x 17" hard copies of the proposed preliminary Project schedule, as well as the native electronic schedule data file, in .XER file format, per the direction of the City.

b. A Schedule Narrative Report detailing the Contractor's initial plan for executing the Contract work within the allotted Contract Duration, and include the following explanation of their provided preliminary schedule:

i. The proposed WBS;
ii. All proposed Project Calendars;
iii. All proposed Activity Codes, clearly defined;
iv. The proposed Activity ID format; and
v. Schedule basis narrative, which must memorialize assumptions made in the development of the schedule.

C. Baseline Schedule

1. The City will return comments within ten (10) Work Days after receipt of the initial Project Schedule Submission. If any of the required submissions are returned to the Contractor for

corrections or revisions, they must be resubmitted within five (5) Work Days from receipt of comments. Each resubmittal must comply with the requirements enumerated above. Review and response by the City will be given within ten (10) Work Days after resubmission.

2. At the request of the City, the Contractor will be required to participate in Project meetings necessary to obtain an acceptance of the above noted submittals.

3. Baseline Schedule submittal must contain a Narrative Report. It must include the following, or as directed by the City:

   a. A description of the Project scope and how the Work is represented in the schedule Activities;

   b. A description of the overall sequence of major components of Work;

   c. Planned work week for each definable feature of work;

   d. Description of the Critical Path and near Critical Paths;

   e. Basis of Durations, described in terms of quantity and production rate;

   f. How weather will be accommodated in the schedule, including a description of the weather calendar and the Activities it is applied to, and the NOAA Inclement Weather data that defined the number of non-Work Days;

   g. How regulatory, operational or third-party constraints are accommodated in the schedule;

   h. Description of key Project coordination points or events;

   i. Discussion of long lead items and basis of time frames for submittals;

   j. Description of anticipated means and methods for large quantity production Activities; and,

   k. Potential opportunities and risks, including quantification of the schedule reduction or expansion.

D. Project Schedule Updates

1. Every schedule submittal must be provided with a corresponding narrative. These schedule submittals and narratives are to be submitted in hard copy, as well as in the native electronic format, as attachments to emails or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files (P6 (.XER) for Primavera schedule files and MS Word and/or Adobe Acrobat for Narrative and supporting document submittals).

2. For each submittal of the updated Project Schedule, the following layouts, reports, and graphics are required in the specified formats, unless otherwise directed by the City:

   a. The Contractor must furnish two (2) 11” x 17” hard copies of the complete progress schedule with each initial schedule update and final update incorporating comments furnished by the City. Additionally, the Contractor must provide the native electronic schedule data file, in .XER file format, with the initial and final schedule update submission.

   b. An Activity bar chart layout grouped by Activity Code and then sorted by Start Date, Finish Date, and then Total Float.

   c. Each Activity line must display the Activity ID (Act ID), Description (Name), Original Duration (OD), Remaining Duration (RD), Start Date (ES), Finish Date (EF), and Total

Float (TF), Baseline Original Duration (BL OD) Baseline Start (BL Start), Baseline Finish (BL Fin), Baseline Total Float (BL TF).

d. An Activities progress bar must show both current progress update ES and EF, and baseline ES and EF. The top line of the bar chart area must contain the updated ES and EF; the second line below must depict the accepted baseline ES and EF dates.

3. The City may request additional standard P6 reports from time to time at no additional cost.

4. The Monthly Update submittal must contain a Narrative Report. It must include the following, or as directed by the City:

a. Any changes to the schedule basis narrative
b. A discussion of progress through the update period and status of the Project with respect to completion of the schedule. The progress reporting must detail work Activities that relate to the Project's Critical Path and if these Activities are progressing as planned.
c. A discussion of changes, delays or other circumstances affecting Progress including identified risks and opportunities and the Contractor's strategy.
d. A listing and brief explanation of modifications to the previously submitted network including Logic changes and Activity additions, deletions or modifications.
e. An update on the status of long lead items and whether the item is on the Critical Path.
f. The Contractor must report on all out of sequence Activities, the cause of this deviation to plan, and the proposed resolution of this issue.
g. The Contractor must include an explanation of assumptions and exclusions made in developing the schedule update and narrative.
h. A table of permits, showing status and any changes in status.

5. The Contractor must provide a copy of the computer file(s) in electronic format or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files and an electronic copy of the Narrative Report.

1.13 PROJECT SCHEDULE UPDATING:

A. The initial updating must take place immediately after the City accepts the Contractor's Baseline Schedule. The Data Date for the first update must not exceed seven (7) Days from the date of receipt of the accepted Baseline Schedule, or as directed by the City.

B. Subsequent updates of the Project Schedule must be submitted monthly until Substantial Completion. The schedule data date must be the last Work Day of the period unless otherwise directed by the City. Updates must be provided to the City no later than seven (7) Days after the 'schedule Data Date'.

C. Updates must reflect actual or reasonably anticipated progress as of the last Work Day of the period.

D. The City may request meetings with the Contractor to review the Project Schedule and Narrative and jointly verify Project health and information.

E. In addition, the City may request meetings with the Contractor's scheduling representative to:

1. Resolve out-of-sequence Logic;

2. Should out-of-sequence progress occur where Activities have reported progress without predecessor Activities being completed, the Contractor must obtain the City's approval in a Proposed Schedule before revising the Logic ties to reflect the way the Work is actually being performed. Use of progress override by default mechanisms that may be included in CPM scheduling software systems will not be allowed except on a case-by-case basis with the

approval of the City. A written explanation for each instance must be included in the monthly submittal narrative.

3. Assess the impact, if any, of any pending change orders.

4. Incorporate accepted time extensions.

5. Review revised Logic (as-built and projected) and changes in Activity Duration, cost, and labor hours assigned.

F. Contractor's failure to provide required scheduling information within the required timeframe or to adhere to the currently accepted schedule may result in rejection of all or a portion of the progress payment until such time as the required schedule information is submitted and accepted by the City.

G. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the Critical Path have occurred due to action or inaction of the Contractor and, as a result, the date for Substantial Completion will not be met, the Contractor must promptly take some or all of the following actions at no additional cost to the City, unless otherwise directed by the City:

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.

2. Increase the number of working hours per shift, shifts per day, or Work Days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.

3. Reschedule Activities to achieve maximum practical concurrence of accomplishment of Activities and comply with the revised schedule.

4. Submit to the City for review a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule.

5. Add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical or non-critical Activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

H. The City may, at any time during the Project and at no additional cost to the City, require the Contractor to develop a more detailed schedule/ Fragnet than depicted in the Baseline Schedule to provide a clearer understanding of the effort needed to complete an Activity or group of Activities.

I. If the City determines that either the Critical Path is in the negative by four (4) weeks, or that the Project's date for completion may be affected, the Contractor may be required, at no additional cost to the City, to prepare a Recovery Schedule. Such Recovery Schedule is subject to review and acceptance by the City.

1. The recovery schedule must propose alternative methods, overtime, and other means available to the Contractor to recover the delays incurred to date.

2. The Recovery Schedule must be resource-loaded with manpower and equipment required to bring the date for Substantial Completion back into compliance.

J. The Contractor must submit an "As-Built Schedule", as the last schedule update showing all Activities, with the exception of punch list and closeout tasks, at Substantial Completion. This schedule must reflect the exact manner in which the Project was actually constructed.

1.14 TIME IMPACT ANALYSIS:

A. In addition to the requirements of the Standard Construction Contract Article 11, the Contractor must submit a Time Impact Analysis to the Engineer with all requests for time extension.

B. The Time Impact Analysis must include a written narrative and supporting impact schedule Fragnet detailing the Project delays resulting from the alleged delay. The impact schedule Fragnet, separate and distinct from the Progress Schedule update, must demonstrate that the changes or anticipated delays affect Activities of the current accepted Progress Schedule. The impact schedule will be incorporated into the Progress Schedule only after it is accepted by the Commissioner and a time extension is approved. The Fragnet submitted as part of the Time Impact Analysis must illustrate the impact of these changes or delays on the date for Substantial Completion.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 16.20

(No Text on This Page)

SECTION 01 32 16.30
PROJECT SCHEDULES (METHOD C)

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 16.30

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:

1. Methods
2. Definitions
3. Preliminary, Baseline, and Project Schedule Preparation Timeline
4. Preliminary Project Schedule Development
5. Project Schedule
6. Activity and Calendar Coding Structure
7. Work Breakdown Structure (WBS)
8. Major Milestones
9. Short (Three-Week) Interval/Two-Week Look-Ahead
10. Submittals
11. Project Schedule Updating
12. Time Impact Analysis

1.3 METHODS:

A. The Contractor must comply with Project schedule development and updating requirements as specified herein.

1. The Contractor must employ or retain the services of a Construction Scheduler with verifiable construction scheduling experience, subject to review and acceptance by the City. Upon request, the Contractor must provide the City with qualifications and experience of the proposed scheduling staff member(s).

2. The Contractor must prepare, update, and maintain a detailed Project Schedule using a version of scheduling software that is compatible with the City's Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM). All schedule submittals must be developed using Oracle's Primavera P6 EPPM software. Schedules must be developed using accepted CPM techniques using the Precedence Diagramming Method (PDM). The Project Schedule must be developed following Defense Contract Management Agency (DCMA), and American Association of Cost Engineering International (AACE International) guidance. The Contractor will be required to use the Contractor's own P6 license (whether single-user or Enterprise

license), unless otherwise directed by the Commissioner. If directed by the Commissioner prior to the Notice to Proceed (NTP), the Contractor must use the Department's P6 Enterprise license and develop the Progress Schedule within the Department's Enterprise environment.

3. Once the Baseline Schedule is accepted by the City, progress updates to the Project Schedule must be submitted monthly, unless otherwise directed by the City, until Substantial Completion. The Data Date for the schedule updates must use the last Friday of the month, or as directed by the City.

4. The Contractor must be responsible for providing the monthly schedule updates once the Baseline Schedule is approved. Each monthly schedule update must be accompanied with a schedule narrative that explains the following:

   a) The progress of work during that particular period of performance;
   b) Any changes in schedule Logic;
   c) The physical conditions that were used to update every Activities Percent Complete;
   d) Any change in actual Start and Finish Dates;
   e) Any Duration changes;
   f) Any added and deleted Activities; and
   g) Any added Extra Work (e.g., change orders).

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Activity	A representation of a discrete portion of the overall scope of Work or an event through Duration and description in a CPM schedule.
Baseline Schedule	The planned and detailed CPM schedule of Activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work. The Baseline Schedule must be accepted by the City.
Critical Path	The longest sequence of Activities in a network which establishes the minimum length of time for accomplishment of the end event of the Project.
Critical Path Method (CPM)	A management technique used to plan and control a project which combines all relevant information into a single plan defining the sequence and Duration of operations and depicting the interrelationship of the Work elements required to complete the Project.
Current Schedule	The most recently updated schedule that captures progress to date and forecasts the dates for each Activity.
Data Date	The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.

Term	Definition
Duration	The amount of time, in workdays, an Activity will take to perform.
Finish Date	The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Free Float	The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship. (See Finish Date and Late Finish).
Fragnet	Fragmentary network: a portion of a schedule detailing impacts of an event on specific Activities in the broader schedule.
Inclement Weather	Any weather condition, the duration of which varies in excess of the 3-year average published by the National Oceanic and Atmospheric Administration (NOAA) information for the local area.
Integrated Project Schedule	The Commissioner's overall schedule covering design, procurement, and construction. The Commissioner will use the Contractor's Project Schedule to update the Integrated Project Schedule.
Late Finish	An estimate of the latest plausible date an Activity's completion can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Late Start	An estimate of the latest plausible date an Activity's start can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Logic	A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.
Milestone	A key or critical point in time for reference or measurement.
Network Diagram	A graphic diagram of a network schedule, showing Activities and Activity relationships.
Original Duration	The estimated amount of time, in Work Days, an Activity is expected to take to complete at the beginning of a project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Schedule.
Percent Complete	The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated as physical percent complete for payment purposes.

Term	**Definition**
Project Schedule	The Contractor's schedule used to manage the orderly and expeditious completion of the Work. The Project Schedule is initially the accepted Baseline Schedule, and is updated throughout the Project.
Remaining Duration	The amount of time, in Work Days, the remaining scope of Work represented by an Activity is expected to take to complete, measured from the current Data Date.
Resource and Cost Loading	Values assigned for estimated dollars, manpower, equipment and/or materials necessary to complete the scope of Work represented by a specific Activity.
Recovery Schedule	A Recovery Schedule outlining and incorporating extraordinary efforts required to recover lost time with the aim of achieving completion of the Project within the stipulated contract Duration, plus authorized time extensions. In such case, special attention must be given to minimize delays and must establish the nature of efforts; for instance, resources and equipment required, extended hours of work, weekend work, accelerated fabrication, required action(s) or effort(s) by the Contractor, its subcontractors, consultants, clients, end users and/or other concerned parties to recover the schedule.
Revised and/or Updated Schedule	A Baseline Schedule, or Progress Project Schedule, or Recovery Schedule for the Project that shows the actual Duration of all the completed Activities, including Duration of and the reasons for delays, if any have occurred, AND revisions to all remaining Activities of the Contractor and its subcontractors, including changes, if any, to logical ties, interrelations and the sequence of each of the outlined Activities. Any such revisions should be shown on the row just below the approved schedule of the respective Activity so that revisions can be compared. The Revised and/or updated Schedule must be reviewed and approved by the City.
Start Date	The earliest estimated date an Activity is calculated to begin, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Time Impact Analysis	A forward looking (prospective) schedule analysis used to forecast the impact to the Critical Path and to Milestone Finish Dates caused by a single event or series of events. Time Impact Analysis is not a retrospective (forensic) schedule analysis or a what-if schedule analysis of a potential event.
Total Float	The amount of time the start or finish of an Activity can be delayed without affecting the Project completion date.

Term	Definition
Work Breakdown Structure (WBS)	WBS is a deliverable-oriented decomposition of a Project into smaller components. A WBS provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.
Work Days (WD)	Work Days are every consecutive day on the calendar, excluding weekends (Saturday and Sunday) and holidays.

1.5 PRELIMINARY, BASELINE, AND PROJECT SCHEDULE PREPARATION TIMELINE:

A. Upon receipt of the NTP, the Contractor must promptly prepare a preliminary Project Schedule and subsequently a Baseline Schedule and must submit for the City's acceptance as follows:

1. Submit the Contractor's CPM Scheduler's qualifications to the City for approval within seven (7) Days after NTP. The City will respond to the submittal within seven (7) Days of the submittal receipt.
2. The preliminary Project Schedule must be submitted no later than twenty-one (21) Days after NTP.
3. The initial submittal of the Baseline Schedule must be provided to the City for review no later than forty-five (45) Days after NTP.
4. The Contractor must incorporate all corrections and revisions required by the City and provide an updated version of the Baseline Schedule for review and acceptance no later than seventy-five (75) Days after NTP to ensure that the Baseline Schedule is accepted no later than ninety (90) Days after the NTP. The ninety (90) Days must include fourteen (14) Days review time by the City for each submittal of the Baseline Schedule.
5. Once accepted, the Baseline Schedule will be the basis of Project Schedule updates.

B. Remedies

1. Preliminary Project Schedule: The City will take a credit of three thousand dollars ($3,000) if the preliminary Project Schedule is not submitted within twenty-one (21) Days of the NTP.
2. Acceptable Baseline Schedule: The City will take a credit of five thousand dollars ($5,000) if an acceptable Baseline Schedule is not submitted within ninety (90) Days of the NTP.
3. Monthly Progress Schedule updates: The City will take a credit of two thousand dollars ($2,000) for each schedule update not submitted within the period it was due.
4. Scheduling Firm Services: If an acceptable Baseline Schedule is not provided by the Contractor within ninety (90) Days of the NTP or three (3) updates are not provided by the Contractor during the period they are due, the City may engage the services of a scheduling firm to develop a Project schedule or update an existing schedule. The total costs of such services will be deducted from the monies due to the Contractor.
5. Any schedules and updates developed by such scheduling firm are for the City's sole use and do not, in any way, represent an acceptance of responsibility by the City to schedule the Work or relieve the Contractor of the obligation to complete the Work within the Durations specified by the Contract.

6. The City will only accept the submitted information after all corrections have been made and all issues have been resolved. The City may find the Contractor in default if items required by this Section are incomplete.

1.6 PRELIMINARY PROJECT SCHEDULE DEVELOPMENT:

A. The preliminary Project Schedule must be a detailed plan (division level per Construction Specifications Institute (CIS) MasterFormat) of all operations, including submittals, permitting, testing, and construction Activities, for either the first ninety (90) Days after NTP or to the point where the Contractor plans to mobilize on site (whichever is greater). This submittal will also depict a summary level (section level per CSI MasterFormat) schedule of the major Activities for the remainder of the Work.

B. The preliminary Project Schedule will be reviewed by the City and returned with comments, as necessary, within fourteen (14) Days of submittal receipt. Information from the preliminary Project Schedule will be the general foundation for development of the Baseline Schedule.

1.7 PROJECT SCHEDULE:

A. The Baseline Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

B. After the Baseline Schedule is approved, the Project Schedule must be the Contractor's working schedule and must be used to plan, organize, execute and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor’s execution plan to complete the Work.

C. The Project Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

D. The Project Schedule must be the Contractor's working schedule used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all remaining Work.

E. All delay claims must be based on the current approved updates of the Project Schedule.

F. The Contractor must confirm in writing that all subcontractors performing any portion of the Work are in agreement with the accepted Baseline Schedule and the monthly updates.

G. The amount of detail represented in the Baseline and Project Schedule and supporting documents submitted must, at a minimum, include the following, items:

1. Contract Milestones must be identified and included in the Baseline and Project Schedule.
2. All submittal, owner review & approval, purchase, manufacture, and delivery Activities for all major materials and equipment.
3. Deliveries of owner-furnished equipment and/or materials.
4. Preparation, submittal, and approval of drawings, material samples, and safety plans.
5. Preparation, submittal, review, and approval of permits required by all regulatory agencies and other third parties.
6. Performance of tests, submission of test reports, and approval of test results.

7. Commissioning Activities for all commissioned systems and equipment is to be clearly delineated and scheduled such that they will be completed prior to Substantial Completion. Such Activities must include, at a minimum, Pre-Functional testing and check sheets; Testing, Adjusting, and Balancing (TAB) verification; Functional Testing, including testing of all controls; and Owner's demonstration and orientation.
8. Completion dates of all items required for phased completion (if applicable).
9. Completion dates of all items required for Substantial Completion.
10. Completion dates of all items required to obtain a Temporary Certificate of Occupancy (TCO) and Certificate of Occupancy (CO).
11. Completion dates for close-out of regulatory and punch list items prior to Final Acceptance and transfer of the Project.
12. Any additional detail requested by the Commissioner.

H. Activities identified in the Baseline and Project Schedule must have the Duration in units of whole Work Days. Construction Activity Durations must not exceed twenty (20) Work Days unless specifically approved by the City. This is to ensure that Activities are not generalized and that each Activity and sub-Activity are defined as narrowly as reasonable to facilitate schedule tracking. Durations for non-construction Activities such as procurement of materials, delivery of equipment, concrete curing, etc. may exceed twenty (20) Work Days without prior approval; however, these are still subject to review by the City. Durations must be based on the available resources required for performing each Activity and must be the result of definitive labor hours using established production rates, and with consideration of on-site working conditions. If requested by the City, the Contractor must justify the reasonableness of a planned Duration.

I. Activity descriptions must use plain language that clearly and uniquely defines each Activity. Each description must include a verb or work function (e.g. submit, form, pour etc.), an object (e.g. slab, foundation, etc.) and, for any construction Activities, a specific location. The Work related to each Activity must be limited to one responsibility and one trade.

J. Activity relationships must be assigned to clearly establish predecessor and successor relationships to each Activity. Open-ended Activities are not permitted with the exception of the first and last Activities in the network, the first Activity being NTP and the last being Final Acceptance. The use of relationship lag times is discouraged and only permitted with prior approval by the City. The use of negative lag is never permitted.

K. Activity constraint dates are only to be used to reflect contractual constraints unless specifically authorized by the City.

L. Float or slack, in any schedule, must not be for the exclusive use or benefit of either the City or the Contractor, but must be available for use by both the City and the Contractor.

M. Each resubmittal after the Project Schedule is delivered for acceptance must comply with all requirements of this section. Review and response by the City will be given within fourteen (14) Days after resubmission. The Contractor's receipt of the comments within the time specified must not, in any way, affect the Contractor's responsibility to complete the Project within the time fixed in Schedule A.

N. Failure by the City to return comments or indicate acceptance status will in no way relieve the Contractor's obligation to submit monthly schedule updates.

O. At the request of the City, the Contractor must be required to make a presentation to explain or clarify the intended logical sequence of construction Activities depicted in the detailed Project Schedule. The Contractor and designated scheduler must discuss anticipated challenges and outline construction methodology and flow of work to show how and when major Milestones will be achieved. In addition,

the Contractor may, at no cost to the City, be required to participate in additional Project meetings necessary to obtain acceptance of the above-noted submittals.

P. The Contractor must provide a Cost Flow Projection (CFP) summary covering from NTP to Final Acceptance. The CFP summary must match the expected billings for each period of performance.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.7.Q

Q. Schedule Cost and Resource Loading

1. At the direction of the City, and at no additional cost to the City, a Project Schedule must be cost loaded within thirty (30) Days after acceptance of the Baseline Schedule.
2. The Contractor must accurately load all Project Activities with direct field labor associated with the craft or trades required to complete that Activity. All labor must be noted in manhours required to complete the tasking. The Contractor must include in all Activities the hours required of for major pieces of equipment.
3. All Resource ID's must have a unique identifier assigned by the Contractor, and approved by the City, so the Project-specific data can be separated from other data in the system.
4. Cost loading must be accomplished by adding a single summary level cost loaded Activity in the Project Schedule. This Activity will allow initial generation and monthly updates of the planned value that is time-phased into monthly periods.
5. The intent of the cost loading is to facilitate cost forecasting, tracking, and reporting of monthly cost projection. Every month, the cost loaded summary Activity must be updated with earned value for prior months and revised monthly forecast for future periods. If there is a significant difference between the actual cumulative monthly invoice and the cumulative planned value from the cost loaded Project Schedule for any reporting month, the Contractor must provide the City with the reason for variance in the schedule narrative.

1.8 ACTIVITY AND CALENDAR CODING STRUCTURE:

A. The Baseline and Project Schedules must contain a sufficient number of Activities to represent adequate planning and execution of the Work so that it shows an accurate flow of work and demonstrates an understanding of the Project by the Contractor.

B. Activity ID and Calendar Coding

1. The Contractor's proposed Activity and calendar coding and must be submitted with the preliminary Project Schedule. A meeting may be requested by the City to discuss the scheme and other schedule information prior to the submittal of the Project Schedule. The accepted coding scheme and WBS Structure must be incorporated into the Project Schedule.

C. Activity ID Coding

1. All Activities/Resources/Calendars (Baseline and Project Schedules) must be coded inside the P6 Project Environment / Project Level (NOT the Global Environment/Enterprise Level) to facilitate selection, sorting and preparation of reports.
2. Activity coding must consist of the Project ID followed by a dash, followed by Activity coding (PROJECT ID-ACTIVITY CODE). Activity codes must be created at the Project level and must utilize the coding scheme outlined in the table below:

Activity Code	Meaning
RESP	Responsibility: Identify the party (e.g. Contractor, subcontractor, City, etc.) responsible for the Activity.
PHAS	Phase: Breakdown of Activities in Milestones, pre-construction, procurement, construction and close-out Activities.
LOCN	Location: Breakdown by floor or elevation.
AREA	Area: Breakdown by room, area, block or wing. May be used as a subdivision of PHAS to include Milestones, permits, subcontractor approvals, submittals, fabrication and delivery, and subdivision of the Site and buildings into Logical modules, such as by blocks, wings, etc.
TRAD	Trade: Breakdown by CSI Code or section number in the Specifications.

a. Description of schedule Activities must include terminology that represents the scope of work associated with that particular Activity. Terminology used to describe similar actions must be consistent across all segments of work.

b. Naming convention for schedule Activities must be descriptive and indicate the associated work covered by the Activity. Activities must use a verb, noun, and location of the work in the Activity name.

3. Project Calendar Coding

a. All calendars created and assigned to Activities must be Project-level calendars. The Calendar Name must consist of the Project ID number followed by a dash, followed by a descriptive Calendar Name (PROJECT ID-CALENDAR NAME).

1.9 WORK BREAKDOWN STRUCTURE:

A. A multi-level hierarchal WBS must be incorporated in all P6 schedules. An initial, proposed WBS must be submitted with the preliminary Project Schedule. The levels (nodes) must include, but not be limited to:

1. LEVEL 01 – The Project Level.
2. LEVEL 02 – Contains a minimum of four (4) nodes: Pre-Construction, Procurement, Construction or Phase of Construction, and Closeout.
3. LEVEL 03 – Decomposition of each of the four (4) nodes in Level 02 into its constituent parts. This Level must target specific, tangible, scopes of the Project Work.
4. LEVEL 04 – Decomposition of Level 03 Activities providing work package details that provide an understanding of the process to be used to execute the Project Work.

B. The Contractor's proposed WBS must be submitted with the preliminary Project Schedule. The accepted WBS must be incorporated into the Baseline and Project Schedule.

1.10 MAJOR MILESTONES:

A. The schedule must include both contractual and non-contractual Milestones that are provided by the City. These Milestones must be properly associated with the related Work and maintained to represent the progress of the Project.

1.11 SHORT (THREE-WEEK) INTERVAL / TWO-WEEK LOOK-AHEAD:

A. On a weekly basis, the Contractor must provide a three (3) week short interval schedule in a format satisfactory to the City. The purpose of this schedule is to report the actual progress of the past week against the previous short interval look-ahead Activities and add any additional Activities planned for the next two (2) weeks. Electronic and hard copies must be provided to the City on the first day of each work week with the prior week's actual progress included.

B. Each task listed on the short interval schedule must be representative of the most current Project Schedule Update and include a reference to an Activity shown on the current update.

C. The short interval schedule must list all required DDC coordinated activities, including special inspections.

1.12 SUBMITTALS:

A. General

1. Development of the Baseline Schedule and updating of the Project Schedule must follow the DCMA and AACE International guidelines.

2. Each electronic submission of the Project Schedule must be assigned a unique file name consisting of the Project ID (as noted on the NTP), followed by a dash followed by a unique file name clearly marked (i.e. ProjID- B000 = B/L rev0, ProjID-B001 = B/L rev01 etc.) to indicate the specific submission. Similarly, update submittals must be named ProjID-Uxxx where xxx is a sequential number, starting with 001, indicating the revision or issue number.

3. The Contractor must provide all submittals in electronic format and two hard copies.

B. Preliminary Project Schedule

1. For acceptance of the preliminary Project Schedule, the Contractor must submit the following:

a. Two (2) 11" x 17" hard copies of the proposed preliminary Project Schedule, as well as the native electronic schedule data file, in .XER file format, per the direction of the City.

b. A Schedule Narrative Report detailing the Contractor's initial plan for executing the Contract work within the allotted Contract Duration, and include the following explanation of their provided preliminary schedule:

i. The proposed (WBS);
ii. All proposed Project Calendars;
iii. All proposed Activity Codes, clearly defined;
iv. The proposed Activity ID format; and
v. Schedule basis narrative, which must memorialize the assumptions made in the development of the schedule.

C. Baseline Schedule

1. The City will return comments within ten (10) Work Days after receipt of the initial Project Schedule Submission. If any of the required submissions are returned to the Contractor for corrections or revisions, they must be resubmitted within five (5) Work Days from receipt of comments. Each resubmittal must comply with the requirements enumerated above. Review and response by the City will be given within ten (10) Work Days after resubmission.

2. At the request of the City, the Contractor will be required to participate in Project meetings necessary to obtain an acceptance of the above noted submittals.

3. Baseline Schedule submittal must contain a Narrative Report. It must include the following, or as directed by the City:

   a. A description of the Project scope and how the Work is represented in the schedule Activities;

   b. A description of the overall sequence of major components of Work;

   c. Planned work week for each definable feature of work.

   d. Description of the Critical Path and near Critical Paths;

   e. Basis of Durations, described in terms of quantity and production rate;

   f. How weather will be accommodated in the schedule, including a description of the weather calendar and the Activities it is applied to, and the NOAA Inclement Weather data that defined the number of non-work days;

   g. How regulatory, operational or third-party constraints are accommodated in the schedule;

   h. Description of key Project coordination points or events;

   i. Discussion of long lead items and basis of time frames for submittals;

   j. Description of anticipated means and methods for large quantity production Activities;

   k. Potential opportunities and risks, including quantification of the schedule reduction or expansion; and

   l. Assumptions/exclusions made in the schedule.

D. Project Schedule Updates

1. Every schedule submittal must be provided with a corresponding narrative. These schedule submittals and narratives must be submitted in hard copy and the native electronic format as attachments to emails or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files (P6 (.XER) for Primavera schedule files and MS Word and/or Adobe Acrobat for narrative and supporting document submittals).

2. For each submittal of the updated Project Schedule, the following layouts, reports, and graphics are required in the specified formats, unless otherwise directed by the City:

   a. The Contractor must furnish two (2) 11” x 17” hard copies of the complete progress schedule with each initial schedule update and final update incorporating comments furnished by the City. Additionally, the Contractor must provide the native electronic schedule data file, in .XER file format with the initial and final schedule update submission.

   b. An Activity bar chart Layout grouped by Activity Code and then sorted by Start Date, Finish Date, and Total Float.

   c. Each Activity line must display the Activity ID (Act ID), Description (Name), Original Duration (OD), Remaining Duration (RD), Start Date (ES), Finish Date (EF), and Total Float (TF), Baseline Original Duration (BL OD), Baseline Start (BL Start), Baseline Finish (BL Fin), Baseline Total Float (BL TF).

   d. An Activities progress bar must show both current progress update ES and EF, and baseline ES and EF. The top line of the bar chart area must contain the updated ES and EF; the second line below must depict the accepted baseline ES and EF dates.

3. The City may request additional standard P6 reports from time to time at no additional cost.

4. The Monthly Update submittal must contain a Narrative Report. It must include the following, or as directed by the City:

   a. Any changes to the schedule basis narrative;

   b. Overall health of the Project;

   c. Actual Activity Start Dates;

   d. Actual Activity Finish Dates;

   e. The physical conditions that were used to update Activities percent complete

   f. Percent of Work reported in place;

   g. Contract and Milestone completion date status:

      i. Number of Days ahead or behind schedule; and
      ii. Days lost/gained compared with the previous update.

   h. Schedule change report organized by Milestone and area comparing the number of Activities that were planned to start and finish to the number that actually started and finished for the reporting period;

   i. Lookahead report listing each Activity in the CPM schedule that is scheduled to be performed during the next reporting period;

   j. Plans for executing scheduled Activities during the next reporting period;

   k. Analysis, organized by Milestone and area, of the Critical Path and near Critical Path(s) describing:

      i. The nature of the Critical Path/near Critical Path;
      ii. Impact on other Activities, Milestones and Finish dates; and
      iii. Identify, or update, risks and opportunities that may impact the Critical Path/near Critical Paths.

   l. List of current and anticipated delays by Milestone:

      i. Cause of the delay;
      ii. Corrective actions and schedule adjustments to correct the delay;
      iii. Impact of the delay on other Activities, Milestones and completion dates; and
      iv. Weather delays, when applicable. The Contractor must describe how the impacts of weather conditions and constraints were absorbed and accounted for in the schedule.

   m. Changes in Activity description, Logic, or Duration must be submitted as a separate Proposed Schedule and approved by the City prior to being submitted as an official update. Once allowed, said changes must be grouped and organized in the report in a manner that communicates in detail the rationale associated with each change and the impact upon construction sequence, relationships and the Critical Path. A standard Digger Report is not sufficient to meet this requirement;

   n. Added/deleted Activities and the rationale associated with each action;

   o. Pending issues and status of other items;

   p. Permits, in a tabular format, showing the status and change in status of all permits;

   q. Contract modifications;

   r. Current and potential extra Work, including change orders;

s. Status of long lead procurement items and whether the item is on the Critical Path;

t. Status of Project submittals;

u. Out of sequence report describing the necessity of each Activity relationship shown therein, as described within this Section;

v. Illogical progress/restraint reports (if any);

w. Other Project or scheduling concerns;

x. Electronic copy of the latest CPM schedule update file in Primavera (.XER) format; and

y. Primavera scheduling error report.

1.13 PROJECT SCHEDULE UPDATING:

A. The initial updating must take place immediately after the City accepts the Contractor's Baseline Schedule. The Data Date for the first update must not exceed seven (7) Days from the date of receipt of the accepted Baseline Schedule, or as directed by the City.

B. Subsequent updates to the Project Schedule must be submitted monthly until Substantial Completion is achieved. The schedule Data Date must be set to the last Work Day of the period unless otherwise directed by the City. Updates must be provided to the City no later than seven (7) Days after the 'schedule Data Date'.

C. Updates must reflect actual or reasonably anticipated progress as of the last Work Day of the period.

D. The City may request meetings with the Contractor to review the Project Schedule and narrative and jointly verify Project health and information.

E. In addition, the City may request meetings with the Contractor's scheduling representative to:

1. Resolve out-of-sequence Logic.

2. Should out-of-sequence progress occur where Activities have reported progress without predecessor Activities being completed, the Contractor must obtain the City's approval in a Proposed Schedule before revising the Logic ties to reflect the way the Work is actually being performed. Use of progress override by default mechanisms that may be included in CPM scheduling software systems will not be allowed except on a case-by-case basis with the approval of the City. A written explanation for each instance must be included in the monthly submittal narrative.

3. Assess the impact, if any, of any pending change orders.

4. Incorporate accepted time extensions.

5. Review revised Logic (as-built and projected) and changes in Duration, cost, and labor hours assigned.

F. Contractor's failure to provide required scheduling information within the required timeframe or to adhere to the currently accepted schedule may result in rejection of all or a portion of the progress payment until such time as the required schedule information is submitted and accepted by the City.

G. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the Critical Path have occurred due to action or inaction of the Contractor, and as a result the date for Substantial Completion will not be met, the Contractor must promptly take some or all of the following actions at no additional cost to the City, unless otherwise directed by the City:

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.

2. Increase the number of working hours per shift, shifts per day, or Work Days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.

3. Reschedule Activities to achieve maximum resource utilization across the Project and comply with the revised schedule.

4. Submit to the City a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule. The Contractor must promptly provide the necessary level of effort to bring the Work back on schedule.

5. Add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical, or non-critical Activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

H. The City may, at any time during the Project and at no additional cost to the City, require the Contractor to develop a more detailed schedule/Fragnet than depicted in the Baseline Schedule to provide a clearer understanding of the effort needed to complete an Activity or group of Activities.

I. If the City determines that either the Critical Path is in the negative by four (4) weeks, or that the Project's date for completion may be affected, the Contractor may be required, at no additional cost to the City, to prepare a Recovery Schedule. Such Recovery Schedule is subject to review and acceptance by the City. The Recovery Schedule must propose alternative methods, overtime, and other means available to the Contractor to recover the delays incurred to date.

J. The Contractor must submit an "As-Built Schedule", as the last schedule update showing all Activities, with the exception of punch list and closeout tasks, at Substantial Completion. This schedule must reflect the exact manner in which the Project was actually constructed.

1.14 TIME IMPACT ANALYSIS:

A. In addition to the requirements of the Standard Construction Contract Article 11, the Contractor must submit a Time Impact Analysis to the Engineer with all requests for time extension.

B. The Time Impact Analysis must include a written narrative and supporting impact schedule Fragnet detailing the Project delays resulting from the alleged delay. The impact schedule Fragnet, separate and distinct from the Progress Schedule update, must demonstrate that the changes or anticipated delays affect Activities of the current accepted Progress Schedule. The impact schedule will be incorporated into the Progress Schedule only after it is accepted by the Commissioner and a time extension is approved. The Fragnet submitted as part of the Time Impact Analysis must illustrate the impact of these changes or delays on the date for Substantial Completion.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 16.30

SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 33

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes the following:
1. Photographic Media
2. Construction Photographs
3. Pre-construction Photographs
4. Periodic Construction Progress Photographs
5. Special Photographs
6. DVD Recordings
7. Final Completion Construction Photographs

B. RELATED SECTIONS: include without limitation the following:
1. Section 01 10 00 SUMMARY
2. Section 01 33 00 SUBMITTAL PROCEDURES
3. Section 01 35 91 HISTORIC TREATMENT PROCEDURES
4. Section 01 78 39 CONTRACT RECORD DOCUMENTS
5. Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS

C. PHOTOGRAPHER - The Contractor must employ and pay for the services of a professional photographer who will take photographs showing the progress of the Work.

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 SUBMITTALS:

A. Qualification Data: For photographer.

B. Key Plan: With each Progress Photograph Submittal include a key plan of Project site and building with notation of vantage points marked for location and direction of each image. Indicate location, elevation or story of construction. Include same label information as corresponding set of photographs.

C. Construction Progress Photograph Prints: Take Progress Photographs bi-weekly and submit four (4) color prints of each photographic view for each trade to the Resident Engineer. Such Progress Photographs must be included in each monthly progress report or as otherwise directed by the Resident Engineer.

D. Digital Files: Submit digital files in the format required.

1.5 QUALITY ASSURANCE:

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three (3) years.

1.6 COORDINATION:

A. The Contractor and its subcontractor(s) must cooperate with the photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, such as temporary lighting required to produce clear and well-lit photographs without obscuring shadows.

1.7 COPYRIGHT:

A. The Contractor must include the provisions of this Subsection 1.7 in the agreement between the Contractor and the Photographer who will provide the construction photographs described in this Section. The Contractor must submit to the Resident Engineer a copy of its agreement with the Photographer.

B. Any photographs, images and/or other materials produced pursuant to this Agreement, and any and all drafts and/or other preliminary materials in any format related to such items produced pursuant to this Agreement, will, upon their creation, become the exclusive property of the City.

C. Any photographs, images and/or other materials provided pursuant to this Agreement ("Copyrightable Materials") will be considered "work-made-for-hire" within the meaning and purview of Section 101 of the United States Copyright Act, 17 U.S.C. § 101, and the City will be the copyright owner thereof and of all aspects, elements and components thereof in which copyright protection might exist. To the extent that the Copyrightable Materials do not qualify as "work-made-for-hire," the Photographer hereby irrevocably transfers, assigns and conveys exclusive copyright ownership in and to the Copyrightable Materials to the City, free and clear of any liens, claims, or other encumbrances. The Photographer will retain no copyright or intellectual property interest in the Copyrightable Materials. The Copyrightable Materials must be used by the Photographer for no purpose other than in the performance of this Agreement without the prior written permission of the City. The Department may grant the Photographer a license to use the Copyrightable Materials on such terms as determined by the Department and set forth in the license.

D. The Photographer acknowledges that the City may, in its sole discretion, register copyright in the Copyrightable Materials with the United States Copyright Office or any other government agency authorized to grant copyright registrations. The Photographer must fully cooperate in this effort and agrees to provide any and all documentation necessary to accomplish this.

E. The Photographer represents and warrants that the Copyrightable Materials: (i) are wholly original material not published elsewhere (except for material that is in the public domain); (ii) do not violate any copyright Law; (iii) do not constitute defamation or invasion of the right of privacy or publicity; and (iv) are not an infringement, of any kind, of the rights of any third party. To the extent that the Copyrightable Materials incorporate any non-original material, the Photographer has obtained all necessary permissions and clearances, in writing, for the use of such non-original material under this Agreement, copies of which must be provided to the City.

PART II – PRODUCTS

2.1 PHOTOGRAPHIC MEDIA:

A. Digital Images: Digital files must be captured as 7.2 megapixel files or greater, with a minimum pixel array of 2,400 pixels by 3,000 pixels. The camera used to capture the digital files must be a Digital SLR (Single Lens Reflex) camera or approved equal; "point and shoot" cameras or camera phones are not acceptable. Digital cameras must produce images using true optical resolution; "digital zoom" is not acceptable. Images must not be resized or interpolated. The file format for digital files must be Joint Photographic Experts Group format ("JPG"). The digital files must not be modified or processed in any way to alter the JPG file's metadata, including the photograph's original capture date.

B. Digital Files: Digital files must be submitted on Digital Versatile Disk ("DVD") or as specified by the Commissioner. DVDs must be inserted in standard weight Archival Quality clear poly sheet protectors and submitted in a hard cover three (3) ring binder. The information imprinted on each print must be provided on an Excel file included on the DVD. The DVD must be labeled with the Project ID and the Project description. Labeling using adhesive labels is not acceptable.

C. Prints:
   1. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte color prints on single-weight commercial-grade stock paper, with 1-inch wide margins and punched for standard 3-ring binder.
   2. Identification: On the front of each photograph affix a label in the margin with Project name and date photograph was taken. On the back of each print, provide an applied label or rubber-stamped impression with the following information:
      a. Project Contract I.D. Number.
      b. Project Contract Name.
      c. Name of Contractor. (and Subcontractor Trade Represented)
      d. Subject of Image Taken.
      e. Date and time photograph was taken if not date stamped by camera.
      f. Description of vantage point, indicating location, direction and other pertinent information.
      g. Unique sequential identifier.
      h. Name and address of photographer.

PART III – EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS:

A. General: Take photographs that provide the largest possible depth-of-field while still in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location and direction of view.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
   1. Date and Time: Include date and time in filename for each image.
   2. Field Office Images: Maintain one set of images on USB drive, or other electronic media requested by the Commissioner, in the field office at the Project site so that it is available at all times for reference. Ensure that the images are the same as for those submitted to Commissioner.

3.2 PRE-CONSTRUCTION & PRE-DEMOLITION PHOTOGRAPHS:

A. Before commencement of Contract Work at the Project site, take color photographs of Project site and surrounding properties, including existing structures or items to remain during construction, from different vantage points, as directed by the Resident Engineer.
   1. Flag applicable excavation areas and construction limits before taking construction photographs.

2. Take photographs of minimum eight (8) views to show existing conditions adjacent to property before starting the Work.
3. Take applicable photographs of minimum eight (8) views of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required or directed by the Resident Engineer to record settlement or cracking of adjacent structures, pavements, and improvements.

B. Demolition Operations: Take photographs as directed by the Resident Engineer of minimum of eight (8) views each before commencement of demolition operations, at mid-point of operations and at completion of operations.

C. Pre-Demolition Photographs: Take archival quality color photographs, to include all exterior building facades, of all structures at the Project site designated to be fully demolished or removed in compliance with New York City Building Code requirements. Submit four (4) complete sets of pre-demolition photographs, in the format specified herein, to the Resident Engineer for submission to the New York City Department of Buildings.

3.3 PERIODIC CONSTRUCTION PROGRESS PHOTOGRAPHS:

A. Take photographs of minimum eight (8) views bi-weekly as directed by the Resident Engineer of construction progress for each contract trade. Select vantage points to show status of construction and progress since last photographs were taken.

3.4 SPECIAL PHOTOGRAPHS:

A. The photographer must take special photographs of subject matter or events as specified in other sections of the Project Specifications from vantage points specified or as otherwise directed by the Resident Engineer.

B. Historical Elements: As required in Section 01 35 91 HISTORIC TREATMENT PROCEDURES, for Contract Work at designated landmark structures or sites, the photographer, as specified and required by individual sections of the Contract documents or at the direction of the Commissioner, must take images of existing elements scheduled to be removed for replacement, repair or replication in quantities as directed, including post-construction photographs of completed Work as directed by the Commissioner.

1. Take Presentation Quality Photographs of designated landmark structures as directed by the Commissioner for submission to the New York City Landmarks Preservation Commission. Provide a minimum of four (4) color photographic prints of each view as directed.

3.5 VIDEO RECORDING:

A. When Video Recording of Demonstration and Orientation sessions is required, the Contractor must provide the services of a Videographer as indicated in Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.

3.6 FINAL COMPLETION CONSTRUCTION PHOTOGRAPHS:

A. For submission as Project Record Documents, take color photographs of minimum eight (8) unobstructed views of the completed Project and/or Project site, as directed by the Commissioner and after all scaffolding, hoists, shanties, field offices or other temporary work has been removed and final cleaning has been done after date of Substantial Completion. Submit four (4) sets of each view of Presentation Quality photographic prints, including negatives and/or digital images electronic file.

END OF SECTION 01 32 33

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART I – GENERAL:

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Coordination Drawings, Catalogue Cuts, Material Samples, and other Submittals required by the Contract Documents.
B. Review of Submittals does not relieve the Contractor of responsibility for any Contractor's errors or omissions in such Submittals, nor from responsibility for complying with the requirements of the Contract.
C. Responsibility of the Contractor: The approval of Shop Drawings will be general and will not relieve the Contractor of the following responsibilities:
   1. Accuracy of such Shop Drawings;
   2. Proper fitting and construction of the Work
   3. Furnishing of materials or Work required by the Contract that may not be indicated on the Shop Drawings.
D. Approval of Shop Drawings must not be construed as approving departures from the Contract Drawings, Supplementary Drawings, or Specifications.
E. This Section includes the following:
   1. Definitions
   2. Submission Procedures
   3. Coordination Drawings
   4. LEED Submittals
   5. Ultra Low Sulfur Diesel Fuel Reporting
   6. Construction Photographs and Recordings
   7. As-Built Documents

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
C. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
D. Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION
E. Section 01 40 00 QUALITY REQUIREMENTS
F. Section 01 77 00 CLOSEOUT PROCEDURES
G. Section 01 78 39 CONTRACT RECORD DOCUMENTS
H. Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS
I. Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS
J. Section 01 81 13.10 ENVIRONMENTALLY PREFERABLE PURCHASING (EPP) COMPLIANCE

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and Specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

C. Action Submittals: Written and graphic information, or physical samples that require responsive actions and include, without limitation, all Shop Drawings, product data, letters of certification, tests and other information required for quality control and as required by the Contract Documents.

D. Informational Submittals: Written and graphic information that does not require responsive action. Informational Submittals may be rejected for non-compliance with the Contract.

E. Shop Drawings: Drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, except for coordination drawings, specifically prepared for the Project by the Contractor or any subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the Work must be fabricated and/or installed.

F. Coordination Drawings: As required in Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION.

G. Product Data and Quality Assurance Submittals: Includes manufacturer's standard catalogs, pamphlets, and other printed materials including without limitation the following:

1. Catalogue and Product specifications
2. Installation instructions
3. Color charts
4. Catalog cuts
5. Rough-in diagrams and templates
6. Wiring diagrams
7. Performance curves
8. Operational range diagrams
9. Mill reports
10. Design data and calculations
11. Certification of compliance or conformance
12. Manufacturer's instructions and field reports

1.5 COORDINATION DRAWINGS:

A. Coordination Drawings, General: When coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity, or where limited space availability necessitates coordination, prepare Coordination Drawings according to requirements in individual Sections as a prerequisite to submittal of Shop Drawings.

1. Content: Project-specific information, shown accurately to a scale large enough to indicate and resolve conflicts. Do not base Coordination Drawings on standard printed data. Include the following information, as applicable for the Project:

    a. Use applicable background views as a basis for preparation of coordination layouts. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    b. Coordinate the addition of trade-specific information by multiple contractors in a sequence that best presents the information and resolution of conflicts between installed components, before submitting for review.
    c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, plumbing, fire protection, and electrical systems.
    d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    f. Indicate required installation sequences.
    g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Commissioner indicating proposed resolution of such conflicts.

B. Coordination Drawing Organization: Organize Coordination Drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling raised access floor and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide Coordination Drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.
    d. HVAC equipment

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

e. Indicate runs and locations of Audio Visual and Information Technology, and security devices.

8. Fire-Protection System: Show the following:

a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

C. The Contractor must issue the completed Coordination Drawing(s) to the Design Consultant for his/her review. The Design Consultant may call as many meetings as necessary with the Contractor, including attendance by applicable subcontractors, and may call on the services of the applicable sub consultant(s) where necessary, to resolve any conflicts that become apparent.

D. Upon resolution of any conflicts, the Contractor must provide a final Coordination Drawing(s) which will become the Master Coordination Drawing(s). The Master Coordination Drawing(s) must be signed and dated by the Contractor to indicate acceptance of the arrangement of the Work.

E. A reproducible copy of the Master Coordination Drawing(s) must be provided by the Contractor to each of the appropriate subcontractor(s), the Resident Engineer and the Design Consultant for information.

F. Shop Drawings must not be submitted prior to acceptance of the final coordinated drawings and must be prepared in accordance with the Master Coordination Drawing(s). No work will be permitted without accepted Shop Drawings. It is therefore essential that this procedure be instituted as quickly as possible.

G. Coordination Drawing Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Design Drawings.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. BIM File Incorporation: Submit or post coordination drawing files using PDF format, unless otherwise directed by Commissioner.
4. Commissioner will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

a. Contractor must execute Digital Data File Release and indemnification form provided by Commissioner.
b. Commissioner makes no representations as to the accuracy or completeness of digital data files as they relate to coordination drawings.

1.6 SUBMITTAL PROCEDURES:

A. Refer to Section 01 35 03 GENERAL MECHANICAL REQUIREMENTS and Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS for additional Submittal requirements involving electrical and mechanical work or equipment of any nature called for in the Project.

B. Coordination: Coordinate preparation and processing of Submittals with performance of construction activities.

1. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals, and related activities that require sequential activities, with the Submittal Schedule specified in Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION.
2. Coordinate transmittal of different types of Submittals for related parts of the Work so processing will not be delayed because of need to review Submittals concurrently for coordination.
3. The Commissioner reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

C. Identification: Place a permanent label or title block on each Submittal for identification.

1. Indicate name of firm or entity that prepared each Submittal on label or title block.

2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Design Consultant.

3. Include the following minimum information on label for processing and recording action taken:
   a. Project name, DDC Project Number, and Contract Number
   b. Date
   c. Name and address of Design Consultant
   d. Name and address of Contractor
   e. Name and address of subcontractor
   f. Name and address of supplier
   g. Name of manufacturer
   h. Submittal number or other unique identifier, including revision identifier
   i. Number and title of appropriate Specification Section
   j. Drawing number and detail references, as appropriate
   k. Location(s) where product is to be installed, as appropriate
   l. Other necessary identification

D. PDF Submittals:

1. Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number. Bind transmittal form with each submittal file package. Transmittal form must be the first page in the PDF file constituting the submittal.

2. Submittal files received from sources other than the Contractor will be rejected without review. Re-submission of the same drawings or product data must bear the original number of the prior submission and the original titles.

E. Web-Based Project Software Submittals: Prepare submittals as PDF files, or other format indicated by Project software website.

F. Transmittal Form: Provide locations on form for the following information:

1. Project name, DDC Project number and Contract Number
2. Date
3. Destination (To:)
4. Source (From:)
5. Names of Contractor, subcontractor, manufacturer, and supplier
6. Category and type of Submittal
7. Submittal purpose and description
8. Specification Section number and title
9. Drawing number and detail references, as appropriate
10. Transmittal number, numbered consecutively
11. Submittal and transmittal distribution record
12. Remarks
13. Signature of transmitter

G. Shop Drawings:

1. Procedures for Preparing, Forwarding, Checking, and Returning all Shop Drawings must be, generally, as follows:

   a. The Contractor must make available to its subcontractors the necessary Contract Documents and must instruct such subcontractor to determine dimensions and conditions in the field, particularly in reference to coordination between the trade subcontractors. The Contractor must direct its subcontractors to prepare Shop Drawings for submission to the Design

Consultant in accordance with the requirements of these General Conditions. The Contractor must also direct its subcontractors to "Ring Up" corrections made on all re-submissions for approval, so as to be readily seen, and that the appropriate symbol per item 2 below (e.g., "GC") be used to identify the source of the correction or information that has been added.

The Contractor must:

1. Review and be responsible for information shown on its subcontractor's Shop and Installation Drawings and manufacturers' data, and conformity to Contract Documents.
2. "Ring Up" corrections made on all submissions for approval, so as to be readily seen, and that the symbol "GC", "PL", "HVAC", or "EL" be used to indicate that the correction and/or information added was made by the Contractor and/or its subcontractor(s).
3. Clearly designate which entity is to perform the Work when the term, "work by others" or other similar phrases are indicated on the Contract Drawings before submission to the Design Consultant.
4. Stamp submissions "Recommended for Acceptance", date and forward to the Design Consultant.

2. The Contractor must promptly prepare and submit project specific layout detail and Shop Drawings of such parts of the Work as are indicated in the Specifications, or as required. These Shop Drawings must be made in accordance with the Contract Drawings, Specifications and Supplementary Drawings, if any. The Shop Drawings must be accurate and distinct and give all the dimensions required for the fabrication, erection, and installation of the Work.

3. Size of Drawings: The Shop Drawings, unless otherwise directed, must be on sheets of the same size as the Contract Drawings, drawn accurately and of sufficient scale to be legible, with a one half (1/2) inch marginal space on each side and a two (2) inch marginal space for binding on the left side.

4. Scope of Drawings: Shop Drawings must be numbered consecutively and must accurately and distinctly represent all aspects of the Work, including without limitation the following:

   a. All working and erection dimensions
   b. Arrangements and sectional views
   c. Necessary details, including performance characteristics and complete information for making necessary connections with other Work
   d. Kinds of materials including thickness and finishes
   e. Identification of products
   f. Fabrication and installation drawings
   g. Roughing-in and setting diagrams
   h. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring
   i. Shop work manufacturing instructions
   j. Templates and patterns
   k. Schedules
   l. Design calculations
   m. Compliance with specified standards
   n. Notation of coordination requirements
   o. Notation of dimensions established by field measurement
   p. Relationship to adjoining construction clearly indicated
   q. Seal and signature of professional engineer if specified
   r. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring
   s. All other information necessary for the Work and/or required by the Commissioner

5. Titles and Reference: Shop Drawings must be dated and contain:
   a. Name of the Project, DDC Project Number, and Contract Number
   b. The descriptive names of equipment or materials covered by the Contract Drawings and the classified item number or numbers.

c. The locations or points and sequence at which materials, or equipment, are to be installed in the Work
d. Cross references to the section number, detail number, and paragraph number of the Contract Specifications
e. Cross references to the sheet number, detail number, etc., of the Contract Drawings

6. Field Measurements: In addition to the above requirements, the Shop Drawings must be signed by the Contractor and, if applicable, the subcontractor responsible for preparation of the Shop Drawings. Each Shop Drawing must be stamped with the following wording:

   FIELD MEASUREMENTS: The Contractor certifies that it has verified and supplemented the Contract Drawings by taking all required field measurements, which said measurements correctly reflect all field conditions and that this Shop Drawing incorporates said measurements.

7. Contractor's Statement with Submittal: Any Submittal by the Contractor for acceptance, including without limitation, all dimensional drawings of equipment, blueprints, catalogues, models, samples and other data relative to the equipment, the materials, the Work or any part thereof, must be accompanied by a statement that the Submittal has been examined by the Contractor and that everything shown in the Submittal is in accordance with the requirements of the Contract Drawings and Specifications. If there is any discrepancy between what is shown in the Submittal and the requirements of the Contract Drawings and Specifications, the Contractor must, in its statement, list and clearly describe each discrepancy.

8. Acceptance will be given based upon the Contractor's representation that what is shown in the Submittal is in accordance with the requirements of the Contract Drawings and Specifications. If the Contractor's statement indicates any discrepancy between what is shown in the Submittal and the requirements of the Contract Drawings and Specifications, such change is subject to review and prior written acceptance by the Design Consultant. In addition, such change may require a change order in accordance with Article 25 of the Contract. In the event any such change is approved, any additional expense or increased cost in connection with the change is the sole responsibility of the Contractor.

9. Submission of Shop Drawings:

   a. Initial Submission: The Contractor must submit seven (7) copies, or as requested by the Resident Engineer, of each Shop Drawing to the Design Consultant for his/her review and acceptance. If PDF drawings are requested by the Resident Engineer, they must be provided in an original "printed from digital" format, and not scanned. The Design Consultant will transmit Shop Drawings to appropriate sub-consultants for review and acceptance, including Commissioning Authority/Agent as applicable. A satisfactory Shop Drawing will be digitally stamped "No Exceptions Taken", be dated and transmitted by the Design Consultant as follows:

      1) Addressed to the Contractor, with a cc to the following:

         a) Design Consultant's sub consultant(s) as appropriate
         b) DDC

      2) Should the Shop Drawing(s) be "Rejected" or noted "Revise and Resubmit" by the Design Consultant, the Design Consultant will transmit the Shop Drawings to the Contractor with the necessary corrections and changes to be made as indicated thereon.

b. Revisions: The Contractor must make such corrections and changes and again transmit each shop drawing to the Design Consultant. The Contractor must revise and resubmit the Shop Drawing as required by the Design Consultant until the Shop Drawings are stamped “No Exceptions Taken”. However, Shop Drawings which have been stamped "Make Corrections Noted" will be considered an "Acceptable" Shop Drawing and NEED NOT be resubmitted.

c. Commencement of Work: No Work or fabrication called for by the Shop Drawings must be done until the acceptance of the said drawings by the Design Consultant is given. In addition to the foregoing Shop Drawing transmissions, a copy of any Shop Drawing prepared by any of the Contractor’s subcontractors which Shop Drawing indicated Work related to, adjacent to, impinging upon, or affecting Work to be done by other subcontractors must be transmitted to the subcontractors so affected. [These accepted Shop Drawings must be distributed to the affected subcontractors when required with a copy of the transmittal to the Resident Engineer.]

d. Variations: If the Shop Drawings show variations from the Contract requirements because of standard shop practice or other reasons, the Contractor must make specific mention of such variations in its letter of Submittal. Acceptance of the Shop Drawings must constitute acceptance of the subject matter thereof only and not of any structural apparatus shown or indicated.

H. Product Data:

1. General: Except as otherwise prescribed herein, the submission, review, and acceptance of Product Data and Catalogue cuts must conform to the procedures specified in subsection 1.6 E, Shop Drawings.

2. If information must be specially prepared for the Submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

3. Mark each copy of the Submittal to show which products and options are applicable.

4. Include the following information, as applicable:

   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Mill reports.
   j. Standard product operation and maintenance manuals.
   k. Compliance with specified referenced standards.
   l. Testing by recognized testing agency.
   m. Application of testing agency labels and seals.
   n. Notation of coordination requirements.

5. Submit Product Data before or concurrent with Samples.

6. Submission of Product Data:

   a. Initial Submission: The Contractor must submit seven (7) sets of Product Data to the Design Consultant for his/her review and acceptance. The Design Consultant will transmit Product Data to appropriate sub-consultants for review and acceptance, including Commissioning Authority/Agent as applicable. A satisfactory catalogue cut will be digitally stamped "No Exception Taken", be dated and transmitted as follows:

1) Addressed to the Contractor, with a cc to the following:

a) Design Consultant's sub consultant(s) as appropriate
b) DDC

2) Should the Product Data be “Rejected” or noted “Revise and Resubmit” by the Design Consultant, the Design Consultant will return one (1) set of such Product Data to the Contractor with the necessary corrections and changes to be made indicated and one (1) set to DDC.

7. Revisions: The Contractor must make such corrections and changes and again submit seven (7) copies of each Product Data for the review of the Design Consultant. The Contractor must revise and resubmit the Product Data as required by the Design Consultant until the submission is stamped “No Exceptions Taken” by the Design Consultant. However, Product Data which has been stamped "Make Corrections Noted" must be considered an "Accepted" Product Data and NEED NOT be resubmitted.

I. Samples of Materials:

1. For samples of materials involving electrical Work of any nature, refer to Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS.

2. Samples must be in triplicate or as directed by the Resident Engineer, and of sufficient size to show the quality, type, range of color, finish and texture of the material.

3. Each of the samples must be labeled as follows:

a. Name of the Project, DDC Project Number and Contract Number
b. Name and quality of the material
c. Date
d. Name of Contractor, subcontractor, manufacturer and supplier
e. Related Specification or Contract Drawing reference to the samples submitted

4. A letter of transmittal, in triplicate, from the Contractor requesting acceptance must accompany all such samples.

5. Transportation charges to the Design Consultant’s office must be prepaid on all samples forwarded.

6. Samples for testing purposes must be as required in the Specifications.

7. Samples on Display: When samples are specified to be equal to approved product, they must be carefully examined by the Contractor and by those whom the Contractor expects to employ for the furnishing of such materials.

8. Timely Submissions Log/Schedule: Samples must be submitted in accordance with approved Shop Drawing log so as to permit proper consideration without delaying any operation under the Project. Materials should not be ordered until acceptance is received, in writing, from the Design Consultant. All materials must be furnished equal in every respect to the accepted samples.

9. The acceptance of any samples will be given as promptly as possible, and will be only for the characteristic color, texture, strength, or other feature of the material named in such acceptance, and no other. When this acceptance is issued by the Design Consultant, it is done with the distinct understanding that the materials to be furnished will fully and completely comply with the Specifications, the determination of which may be made at some later date by a laboratory test or by other procedure. Use of materials will be permitted only so long as the quality remains equal to the approved samples and complies in every respect with the Specifications, and the colors and textures of the samples on file in the office of the Design Consultant, for the Project.

10. Acceptability of test Data: The Commissioner will be the final judge as to acceptability of laboratory test data and performance in service of materials submitted.

11. Valuable Samples: Valuable samples, such as hardware, plumbing and electrical fixtures, etc., not destroyed by inspection or test, will be returned to the Contractor and may be incorporated into the Work after all questions of acceptability have been settled, providing suitable permanent records are made as to the location of the samples, their properties, etc.

J. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

K. Supplementary Qualification Data: Prepare written information that demonstrates capabilities and experience of entity. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

L. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

M. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS formats. Include names of firms and personnel certified.

N. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

O. Equivalent Quality: Any material, article and/or equipment which is designated in the Drawings and/or Specifications by a number in the catalogue of any manufacturer or by a manufacturer's grade or trade name is designated for the purpose of describing the material, article and/or equipment and fixing the standard of performance and/or function, as well as the quality and/or finish. Any material, article and/or equipment which is other than what is specified in the Drawings and/or Specifications will only be accepted if the Commissioner makes a written determination that such material, article and/or equipment is equivalent to that which is specified in the Drawings and/or Specifications.

P. The submission of any material, article and/or equipment as the equal of any material, article and/or equipment set forth in the Drawings and/or Specifications as a standard must be accompanied by any and all information essential for determining whether such proposed material, article and/or equipment is equivalent to that which is specified. Such information must include, without limitation, illustrations, drawings, descriptions, catalogues, records of tests, samples, as well as information regarding the finish, durability and satisfactory use of such proposed material, article and/or equipment under similar operating conditions.

Q. Engineering Services Submittals:

1. Performance and Design Criteria: Refer to Section 01 40 00 QUALITY REQUIREMENTS, Article 1.5.

2. Engineering Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible professional engineer, for each product and system specifically required of the Contractor to be designed or certified by a professional engineer.

    a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

3. BIM Incorporation: Incorporate engineering services drawing and data files into BIM established for

Project.

a. Prepare engineering services documents in the required formats, including BIM incorporation.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.7

1.7 LEED SUBMITTALS:

A. Comply with Submittal requirements specified in the following sections:

1. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL;
2. Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS, as applicable;
3. Section 01 81 13.13 VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS FOR LEED v3 BUILDINGS;
4. Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS;
5. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS; and/or,
6. Section 01 91 15 BUILDING ENCLOSURE COMMISSIONING REQUIREMENTS.

B. LEED Building Submittal information must be assembled into one package per each applicable Specification Section, separate from all other non-LEED Submittals. Each Submittal package must have a separate transmittal and identification as described in Subsection 1.5 herein.

C. Number of Copies: Submit four (4) copies of LEED Submittals, in accordance with procedure described in Article 1.5 herein, unless otherwise indicated.

D. Material Safety Data Sheets (MSDSs) for LEED Certification: Submit information necessary to show compliance with LEED certification requirements, which will be the limit of the Design Consultant's review for LEED compliance.

1. Designated LEED Submittals that include non-LEED MSDS data will not be reviewed. The entire Submittal will be returned for re-submission.

E. Product Cut Sheets and/or Shop Drawings for LEED Certification: Provide product cut sheets and/or shop drawings with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project. For detailed requirements refer to Subsection 1.6 of Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 PROJECTS, or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

1. Provide the quantity, length, area, volume, weight, and/or cost of each product submitted as required to satisfy LEED documentation requirements. Refer to Subsection 1.6 of Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 PROJECTS.

1.8 ULTRA LOW SULFUR DIESEL FUEL AND BEST AVAILABLE TECHNOLOGY REPORTING:

A. In accordance with Section 01 10 00 SUMMARY, Subsection 1.10 E**,** the Contractor must submit reports to the Commissioner regarding the use of Ultra Low Sulfur Diesel Fuel and Best Available Technology (BAT) in Non road Vehicles. Submission of such reports must be in accordance with the schedule, format, directions and procedures established by the Commissioner.

1.9 CONSTRUCTION PHOTOGRAPHS AND VIDEO RECORDINGS:

A. Submit construction progress photographs and Video recordings in accordance with requirements of Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

1.10 AS-BUILT DOCUMENTS:

A. Submit all as-built documents in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 33 00

(No Text on This Page)

SECTION 01 35 03

GENERAL MECHANICAL REQUIREMENTS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 35 03

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. The General Mechanical Requirements contained herein must be followed by the Contractor, as well as its subcontractor for HVAC work. This Section sets forth the General Requirements applicable to mechanical work for the Project. Such requirements are intended to be read in conjunction with the Specifications and Contract Drawings for the Project. In the event of any conflict between the requirements set forth in this Section and the requirements of the Specifications and/or the Contract Drawings, whichever requirement is the most stringent must take precedence.

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS
D. Section 01 42 00 REFERENCES
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. CONCEALED PIPING AND DUCTS: piping and ducts hidden from sight in masonry or other construction, in floor fill, trenches, partitions, hung ceilings, furred spaces, pipe shafts and in service tunnels not used for passage. Where piping and ducts run in areas that have hung ceilings, such piping and ducts must be installed in the hung ceilings. For Work on existing piping, any insulation on such existing piping is to be tested for asbestos and abated if found to be positive by a certified asbestos contractor. Such testing and abatement must occur prior to the performance of any Work on these pipes.

1.5 SUBMITTALS:

A. INTENT OF MECHANICAL CONTRACT DRAWINGS – Mechanical Contract Drawings are, in part, diagrammatic and show the general arrangement of the equipment, ducts, and piping included in the Contract and the approximate size and location of the equipment.

B. The Contractor must follow these Contract Drawings in laying out the Work and verify the spaces in which it will be installed. The Contractor must submit, as directed, Mechanical Shop Drawings, roughing drawings,

manufacturer's Shop Drawings, field drawings, cuts, bulletins, etc., of all materials, equipment and methods of installation shown or specified in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

1. Submit sheet metal shop standards. Submit manufacturer's product data including gauges, materials, types of joints, scaling materials and installations for metal ductwork materials and products.
2. Submit scaled layout drawing (3/8"=1') of metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, slopes of horizontal runs, wall and floor penetrations and connections. Show modifications of indicated requirements made to conform to local shop practice and how those modifications ensure that free area, materials and rigidity are not reduced. Layouts should include all the room plans, mechanical equipment rooms and penthouses. Method of attachment of duct hangers to building construction all with the support details. Coordinate Shop Drawings with related trades prior to submission.
3. Indicate duct fittings, particulars such as gauges, sizes, welds and configuration prior to start of work for low-pressure systems.
4. Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data and shop drawings in maintenance manual.

1.6 ACCESS:

A. All Work must be installed by the Contractor to readily provide access for inspection, operation, maintenance and repair. Minor deviations from the arrangement indicated on the Contract Drawings may be made to accomplish this, but they must not be made without prior written approval by the Commissioner.

1.7 CHANGES IN PIPING, DUCTS, AND EQUIPMENT:

A. Wherever field conditions are such that for proper execution of the Work, reasonable changes in location of piping, ducts, and equipment are necessary and required, the Contractor must make such changes as directed and approved, without extra cost to the City.

1.8 CLEANING OF PIPING, DUCTS, AND EQUIPMENT:

A. Piping, ducts, and equipment must be thoroughly cleaned by the Contractor of all dirt, cuttings, and other foreign substances. Should any pipe, duct, or other part of the several systems be obstructed by any foreign matter, the Contractor will be required to pay for disconnecting, cleaning, and reconnecting wherever necessary for the purpose of locating and removing obstructions. The Contractor must pay for repairs to other work damaged in the course of removing obstructions. For work on existing piping, ducts, and equipment, the Contractor must pay special attention during this task so as not to disturb the insulation on such piping, ducts, or equipment.

1.9 STANDARDIZATION OF SIMILAR EQUIPMENT:

A. Unless otherwise particularly specified, all equipment of the same kind, type, or classification, used for identical purposes, must be the product of one (1) manufacturer.

1.10 SUPPORTING STRUCTURES DESIGNED BY THE CONTRACTOR:

A. Unless otherwise specified, supporting structures for equipment to be furnished by the Contractor must be designed by an Engineer licensed in New York State retained by the Contractor. Supporting structures must be built by the Contractor of sufficient strength to safely withstand all stresses to which they may be

subjected, within permissible deflections, and must meet the following standards:

1. Structural Steel - ASTM Standard Specifications, AISC and New York City Construction Codes.
2. Concrete for supports for equipment must conform to the Specifications for concrete herein, but in no case must be less than the requirements of the New York City Construction Codes for average concrete.
3. Steel reinforcement for concrete must be of intermediate grade and must meet the requirements of the Standard Specifications for Billet Steel-Concrete Reinforcement Bars, ASTM.
4. Drawings and calculations must be submitted for review and acceptance in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

1.11 ELIMINATION OF NOISE:

A. All systems and/or equipment provided under the Contract must operate without objectionable noise or vibration.

B. Should operation of any one or more of the several systems produce noise or vibration which is, in the opinion of the Commissioner, objectionable, the Contractor must, at its own expense, make changes in piping, equipment, etc., and do all work necessary to eliminate objectionable noise or vibration.

C. Should noise or vibration that is found objectionable by the Commissioner be transmitted by any pipe or portions of the structure from systems and/or equipment installed under the Contract, the Contractor must, at its own expense, install such insulators and make such changes in or additions to the installations as may be necessary to prevent transmission of this noise or vibration.

1.12 PRELIMINARY FIELD TEST:

A. As soon as conditions permit, the Contractor must furnish all necessary labor and materials for, and must make preliminary field tests of the equipment to ascertain compliance with the requirements of the Contract. If the preliminary field tests disclose equipment that does not comply with the Contract, the Contractor must, prior to the acceptance test, make all changes, adjustments, and replacements as required.

1.13 INSTRUCTIONS ON OPERATION:

A. At the time the equipment is placed in permanent operation by the City, the Contractor must make all adjustments and tests required by the Commissioner to prove that such equipment is in proper and satisfactory operating condition. The Contractor must instruct the City's operating personnel on the proper maintenance and operation of the equipment for the period of time called for in the Specifications.

1.14 CERTIFICATES:

A. On completion of the Work, the Contractor must obtain certificates of inspection, approval, and acceptance, and be in compliance with all laws from all agencies and/or entities having jurisdiction over the Work and must deliver these certificates to the Commissioner in accordance with Section 01 77 00 CLOSEOUT PROCEDURES. The Work will not be deemed substantially complete until the certificates have been delivered.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 35 03

(No Text on This Page)

SECTION 01 35 06
GENERAL ELECTRICAL REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section sets forth the General Requirements applicable to electrical work for the Project. Such requirements are intended to be read in conjunction with the Specifications and Contract Drawings for the Project. In the event of any conflict between the requirements set forth in this Section and the requirements of the Project Specifications and/or the Contract Drawings, whichever requirement is the most stringent, as determined by the Commissioner, must take precedence.

B. This Section includes the following:
   1. Related Sections
   2. Definitions
   3. Procedure for Electrical Approval
   4. Submittals
   5. Electrical Installation Procedures
   6. Electrical Conduit System Including Boxes (Pull, Junction and Outlet)
   7. Electrical Wiring Devices
   8. Electrical Conductors and Terminations
   9. Circuit Protective Devices
   10. Distribution Centers
   11. Motors
   12. Motor Control Equipment

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 35 03 GENERAL MECHANICAL REQUIREMENTS
D. Section 01 42 00 REFERENCES
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. WIRING: contains wire and raceway (rigid steel, heavy wall conduit unless specifically indicated otherwise).

B. POWER WIRING: wiring from a panel board or other specified source to a starter (if required), then to a disconnect (if required), then to the final point of usage such as a motor, unit, or device.

C. CONTROL and/or INTERLOCK WIRING: wiring that signals the device to operate or shut down in response to a signal from a remote control device such as a temperature, smoke, pressure, float, etc. device (starters and disconnect switches are not included in this definition) regardless of the voltage required for the controlling device.

D. RIGID STEEL CONDUIT: rigid steel heavy wall conduit that is hot-dip galvanized inside and outside. The conduit must meet the requirements of the latest edition, as amended, of the "Standard for Rigid Steel Conduit" of the Underwriters' Laboratories, Inc. Unless otherwise specified in the Specifications or indicated on the Contract Drawings, rigid steel conduit must be used for all exposed work, all underground conduits in contact with earth, and fire alarms systems, as required by the New York City Construction Codes.

E. ELECTRICAL METALLIC TUBING (EMT): industry standard thin wall conduit of galvanized steel. All elbows, bends, couplings and similar fittings which are installed as a part of the conduit system must be compatible for use with electric metallic tubing. Couplings and terminating fittings must be of the pressure type as approved by the Commissioner. Set screw fittings will not be acceptable. EMT must meet the requirements of the latest edition, as amended, of the "Standard for Electrical Metallic Tubing" of the Underwriters Laboratories Inc. EMT may only be used where specifically indicated. In no case will EMT be permitted in spaces other than hung ceilings and dry wall partitions.

F. FLEXIBLE METALLIC CONDUIT (FMC): a conduit made through the coiling of a self-interlocking ribbed strip of aluminum or steel, forming a hollow tube through which wires can be pulled. For final connections to motors and motorized equipment, not more than a 4' - 0" length of flexible conduit may be used. For watertight installations, this conduit must be of a watertight type, attached with watertight glands or fittings for final connections from outlet box to recessed lighting fixtures and in locations only where specifically permitted by the Specifications or Contract Drawings.

1.5 PROCEDURE FOR ELECTRICAL APPROVAL:

This Section sets forth General Electrical information, as well as required approvals for all electrical work required for the Project, including ancillary electrical work which may be included in the work of other trade subcontractors.

A. ELECTRIC SERVICE: The electric service supply is subject to commercial and operating variation of the utility company. Proper provision must be made to have all apparatus operate normally under these conditions.

B. ACCEPTANCE: Acceptance and approval of the Work will be contingent upon the inspection and test of the installation by the City regulatory agency.

C. TESTS: The Contractor must notify the Commissioner when the Contractor has completed the work and is ready to have it inspected and tested. Upon completion of the Work, tests must be made as required by the Commissioner of all electrical materials, electrical and associated mechanical equipment, and of appliances installed hereunder. The Contractor must furnish all labor and material for such tests. Should the tests show that any of the material, appliances or workmanship is not first class or not in compliance with the Contract, on written notice the Contractor must remove and promptly replace the materials to be in conformity with the Contract.

D. CERTIFICATE OF THE BUREAU OF ELECTRICAL CONTROL, OF THE DEPARTMENT OF BUILDINGS (B.E.C.): Prior to requesting a substantial completion inspection, the Contractor must file a Certificate of Inspection issued by B.E.C. On completion of the Work, the Contractor must obtain certificates of inspection, approval, acceptance and compliance from all agencies and/or entities having jurisdiction over the work and must deliver these certificates to the Commissioner in accordance with Section 01 77 00 CLOSEOUT PROCEDURES.

E. RESPONSIBILITY FOR CARE AND PROTECTION OF EQUIPMENT:

1. The Contractor furnishing any equipment must be responsible for the equipment until it has been inspected, tested and accepted, in accordance with the requirements of the Contract.

2. After delivery, before and after installation, the Contractor must protect all equipment against theft, injury or damage from all causes. The Contractor must carefully store all equipment received for work which is not immediately installed. If any equipment has been subject to possible injury by water, it must be thoroughly dried out and put through a special dielectric test as directed by the Commissioner, at the expense of the Contractor or replaced by the Contractor without additional cost to the city.

F. UNIFORMITY OF EQUIPMENT: Any two (2) or more pieces of equipment, apparatus or materials of the same kind, type, or classification, which are intended to be used for identical types of service, must be made by the same manufacturer.

1.6 SUBMITTALS:

A. CONTRACTOR'S ELECTRICAL DRAWINGS AND SAMPLES FOR APPROVAL:

1. The Contractor must submit to the Commissioner for approval, in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, complete dimensional drawings of all equipment, wiring diagrams, motor test data, details of control, installation layouts showing all details and locations and including all schedules, and descriptions and supplementary data to comprise complete working drawings and instructions for the performance of the Work. A description of the operation of the equipment and controls must be included. A letter, in triplicate, must accompany each submittal.

2. The Contractor must submit in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, duplicate samples of such materials and appliances as may be requested by the Commissioner for approval. These samples must be properly tagged for identification and submitted for examination and test. After the samples are approved, one (1) sample will be returned to the Contractor and the other sample will be filed in the office of the Commissioner's representative for inspection use. After the Contract is completed, the second set of samples will be returned to the Contractor.

B. TIMELINESS: All material must be submitted in accordance with the Submittal Schedule in sufficient time for the progress of construction. Failure to promptly submit acceptable samples and dimensional drawings of equipment will not be accepted as grounds for an extension of time. The Commissioner may decline to consider submittals unless all related items are submitted at the same time.

C. CONTRACTOR'S STATEMENT WITH SUBMITTALS: Contractor must submit a statement in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.

D. BULLETINS AND INSTRUCTIONS: The Contractor must furnish and deliver to the Commissioner in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS and Section 01 77 00 CLOSEOUT PROCEDURES, after acceptance of the work, four (4) complete sets of instructions, technical bulletins and any other printed matter (diagrams, prints, or drawings) required to provide complete information for the proper operation, maintenance and repair of the equipment and the ordering of spare parts.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 ELECTRICAL INSTALLATION PROCEDURES:

This Sub-Section sets forth the General Installation Procedure that must apply to all electrical work and electrical equipment appearing in the Contract.

(Refer to Sub-Section 1.4 DEFINITIONS for terms used in this section)

A. INTENT OF CONTRACT DOCUMENTS: The Drawings and Specifications are to be interpreted as a means of conveying the scope and intent of the work without giving every minor electrical detail. It is intended, nevertheless, that the Contractor must provide whatever labor and materials are found necessary, within the scope of the Contract, for the successful operation of the installation. Specific details of individual installations are to be finally decided upon when the Contractor submits Working or Shop Drawings for approval to DDC. Whenever there are two (2) or more methods to complete Project work within the Contract scope, the Commissioner reserves the right to choose that method which, in the Commissioner's opinion, will afford the most satisfactory performance, lasting qualities, and access for repairs, even if this selection is the costliest.

B. SCHEMATIC PLANS – APPROXIMATE LOCATIONS: Conduits and wiring are shown on the plans for diagrammatic purposes only. Therefore, conduit layouts may not necessarily give the actual physical route of the conduits. The Contractor who installs a conduit system will also be required, as part of the work, to furnish and install all hangers and pull-boxes, including any special pull-boxes found necessary to overcome interferences, and to facilitate the pulling of electrical cables. Similarly, the locations of equipment, appliances, outlets and other items shown on Contract Drawings are only approximate and are to be definitively established when equipment Shop Drawings are submitted and approved by DDC during construction.

C. SLEEVES: required for conduits passing through walls or floors; must be furnished and set by the Contractor installing the conduits. Sleeves in waterproofed floors must be provided with flashing extending twelve (12) inches in all directions from sleeve and secured to waterproofing. Flashing must be turned down into space between pipe and sleeve and caulked watertight. Flashing must be twenty (20) ounces cold rolled copper. Sleeves must be supplied with welded flanges similar to those supplied by the subcontractor for Plumbing Work and must extend one (1) inch above finished floor.

D. COORDINATION: The Contractor must keep in close touch with the construction progress and promptly obtain the necessary information for the accurate placement of its work well before Project construction operations obstruct its work. The Contractor is to consult all other Contract Drawings, as well as approved equipment Shop Drawings on file in the Resident Engineer's Field Office. This will aid in avoiding interferences, omissions, and errors in the electrical installation.

E. RESTORATION: If drilling or cutting is done on finished surfaces of equipment or the structure, any marring of the surface must be repaired or replaced by the Contractor. The Contractor must be held responsible for corrective restoration due to its cutting or drilling, and for any damage to the Project or its contents caused by the Contractor or the Contractor's workers. If any piercing of waterproofing occurs because of the installation of the work, the Contractor must restore the waterproofing, at its own expense, to the satisfaction of the Commissioner.

F. ELECTRICAL WORK AT SITE: The Contractor furnishing equipment consisting of a number of related electrical devices or appliances, mounted in a single enclosure, or on a common base, must furnish this unit, ready for connection and operation, complete with internal wiring, connections, terminal boxes with

copper connectors and/or lugs and ample electrical leads. The cost of any wiring, re-wiring, or other work required to be done on this unit in the field, must be borne by the Contractor, without additional cost to the City.

G. COOPERATION AMONG SUBCONTRACTORS: Whenever an electrically operated unit or system involves the combined work of several subcontractors for its installation and successful operation, the Contractor must require each subcontractor to exercise the utmost diligence in cooperating with others to produce a complete, harmonious installation.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2

3.2 ELECTRICAL CONDUIT SYSTEM INCLUDING BOXES (PULL, JUNCTION AND OUTLET):

This Sub-Section sets forth the requirements applying to the installation of electrical conduits, boxes or fittings. Rigid steel conduit must be used throughout, unless otherwise directed by the Commissioner. Where the word 'conduit' is used without a modifier such as, rigid steel, EMT, etc., must be interpreted to mean rigid steel, heavy wall, threaded conduit.

(Refer to Sub-Section 1.4 DEFINITIONS for terms used in this section)

A. INSTALLATIONS AND APPLICATIONS:

1. Unless otherwise specified or indicated on the Contract Drawings, conduit runs must be installed concealed in finished spaces.

2. CONDUIT SIZES: The sizes of conduits must be as indicated on the Contract Drawings. Wherever conduit sizes are not indicated, the conduit must meet the requirements of the New York City Electrical Code to accommodate the conductors to be installed therein.

3. Conduits must be reamed smooth after cutting. No running threads will be permitted. Universal type couplings must be used where required. Conduit joints must be screwed up to butt. Empty conduits after installation must have all open ends temporarily plugged to prevent the entrance of water or other foreign matter.

4. Conduits installed in concrete or masonry must be securely held in place during pouring and construction operations. A group of conduits terminating together must be held in place by a template.

5. UNDERGROUND STEEL CONDUITS: Unless otherwise specified, all underground steel conduits in contact with earth must be encased by the Contractor who installs them, in a covering of not less than two (2) inches of an approved concrete mixture. Concrete mix must be one (1) part cement to four and one-half (4 ½) parts of fine and coarse aggregate.

6. EXCAVATION RESTORATION PERMITS: When installing underground conduits, duct banks or manholes, the Contractor must perform the work of cutting pavement, excavation shoring, keeping trenches or holes pumped dry, backfilling, restoration of surfaces to original condition and removal of excess earth and rubbish from premises. During the work, the Contractor must provide adequate crossovers, protective barriers, lamps, flags, etc., to safeguard traffic and the public. When the work is in a public highway or street, the Contractor must secure and pay for all necessary permits, inspection fees, and the cost of repaving.

7. EXPOSED CONDUIT SUPPORTS: Exposed conduits must be supported by Galvanized hangers with necessary inserts, beam clamps of approved design, or attached to walls or ceilings by expansion bolts. Exposed conduits must be supported or fastened at intervals not more than five (5) feet.

8. Exposed conduits must be installed parallel or at right angles to ceilings, walls and partitions. Where direction changes of exposed conduit cannot be made with neat bends, as may be required around beams or columns, conduit-type fittings must be used.

9. Conduit must be installed with an expansion joint approved by the Commissioner in the following conditions:

    a. Wherever the conduit crosses a building expansion joint, the Contractor will be held responsible for determining where the building expansion joints are located.

    b. Every 200 feet, when in straight runs of 200 feet or longer.

10. Conduits may only enter and leave a floating slab in a vertical direction, and only in an approved manner. Horizontal entries into floating slabs are not permitted.

11. Conduits installed in pipe shafts must be properly supported to carry the total weight of the raceway system complete with cable. In addition, at least one (1) horizontal brace per 10 ft. section must be provided to assure stability of the raceway system.

12. BUSHINGS AND LOCKNUTS: Approved bushings and locknuts must be used wherever conduits enter outlet boxes, switch boxes, pull boxes, panel board cabinets, etc.

13. CONDUIT BENDS: must be made without kinking conduit or appreciably reducing the internal diameter. All bends in conduits of two (2) inch in diameter or larger must be made with a hydraulic or power pipe bender. The radius of the inner edge of any bend must not be less than six (6) times the internal diameter of the conduit where rubber covered conductors are to be installed, and not less than ten (10) times the internal diameter of the conduit where lead covered conductors are to be used. Long gradual sweeps will be required, rather than sharp bends, when changes of direction are necessary.

14. EMPTY CONDUITS

    a. TESTS: All conduits and ducts required to be installed and left empty must be tested for clear bore and correct installation by the Contractor using a ball mandrel and a brush and snake before the installation will be accepted. The ball must be turned to approximately 85% of the internal diameter of the raceway to be tested. Two (2) short wire brushes must be included in the mandrel assembly. Snaking of conduits, ducts, etc., must be performed by the Contractor in the presence of the Resident Engineer. Any conduits or ducts which reject the mandrel must be cleared at once with the Contractor bearing all costs, such as chopping concrete, to replace the defective conduit and restore the surface to its original condition.

    b. TAGS: Numbers or letters must be assigned to the various conduit runs, and as they test clear they must be identified by a fiber tag not less than 1-¼ inch width, attached by means of a nylon cord. All conduit terminations in panel, splice or pull boxes, as well as those out of the floor or ceiling, must be tagged.

    c. TEST RECORDS: As the conduit runs clear, a record must be kept under the heading of "Empty Conduit Tested, Left Clear, Tagged and Capped" showing conduit designation, diameter, location, date tested and by whom. When complete, this record must be signed by the Resident Engineer and submitted in triplicate for approval. This record must be entered on the Contract Record Drawings under Section 01 78 39 CONTRACT RECORD DOCUMENTS.

    d. CAPPING: After test, all empty conduit and duct openings, must be capped or plugged by the Contractor as directed.

    e. DRAG LINES: A drag line must be left in all empty conduit.

B. BOXES:

1. The Contractor must furnish and erect all pull boxes indicated on the plans or where required. Sides, top and bottom of pull boxes must be Galvanized coated and must be built of No. 12 USSG steel reinforced at corners by substantial angle irons and riveted or welded to plates. Bottom or side of pull boxes must be removable and held in place by corrosion resistant machine screws. Pull boxes in damp locations must have threaded hubs and gaskets and be NEMA 4X. All pull boxes must be suspended from ceiling or walls in the most substantial manner.

2. In centering outlets, the Contractor is cautioned to allow for overhead pipes, ducts and other obstructions, and for variations in arrangement and thickness of fireproofing, soundproofing and plastering. Precaution should be exercised regarding the location of window and door trims, paneling, etc. Mistakes resulting from failure to exercise precaution must be corrected by the Contractor at no additional cost to the City. Outlets in hung ceilings must be supported from the black iron or structure.

3. The exact location of all outlets in finished rooms must be as directed by the Commissioner. When the interior finish has been applied, the Contractor must make any necessary adjustment of its work to properly center the outlets. All outlet boxes for local switches near doors must be located at the strike side of doors as finally hung, whether so indicated on the drawings or not.

4. Exposed wall outlet boxes must be securely anchored, erected neatly and tight against the walls.

5. All wall outlets of each type must be set accurately at the same level on each floor, except where otherwise specified or directed by the Commissioner. Where special conditions occur, outlets must be located as directed.

6. MOUNTING HEIGHTS: The following heights are standard heights and are subject to correction due to coordination with Contract Drawings. All such changes must be approved by the Resident Engineer. Heights given are from finished floor to center line of outlet or device on wall or partition, unless otherwise indicated.

a.	General Convenience Outlets (mount vertical)	1'-6"
b.	Clock Outlets	8'-6"or 1'-6" below ceiling
c.	Wall Lighting Switches	4'-0"
d.	Motor Controllers	5'-0"
e.	Motor Push-button	4'-2"
f.	Telephone Outlets	As Directed by the Commissioner
g.	Fire Alarm Bells	8'-6"or 1'-6" below ceiling
h.	Fire Alarm Stations	4'-0"
i.	Intercom Outlet	1'-6"
j.	Cooking and Refrigerator Unit	As Directed

7. Outlet boxes must be of a design and construction approved by the Commissioner. The type of box, including its form and dimensions, must be appropriate for: its specific location; the kind of fixture to be used; and, the conduits (both quantity and type) that will connect to it. All ferrous outlet boxes must meet the requirements for zinc coating as specified under Electrical Conduit Systems.

8. Knockouts will only be opened to insert conduit. Any outlet boxes with more openings than are necessary for conduit insertion must be sealed by the Contractor without additional charge.

9. All outlet boxes and junction boxes for exposed work must be galvanized cast iron or cast aluminum with threaded openings. Outlet boxes for exposed inside work in damp locations must be galvanized cast iron or cast aluminum with threaded hubs and neoprene gaskets.

10. Junction boxes must not be less than 4 11/16" square and must be equipped with zinc coated plates. Where plates are exposed, they must be finished to match the room decor.

11. FIXTURE SUPPORTS: Outlet boxes supporting lighting fixtures must be equipped with fixture studs held by approved galvanized stove bolts or integral with the box. Cast iron or malleable boxes must have four (4) tapped holes for mounting required cover or fixtures.

12. Outlet boxes exposed to the weather or indicated W.P. must be cast iron or cast aluminum with the covers made watertight with neoprene gaskets. The boxes must have external lugs for mounting. Drilling of the body of the fitting for mounting will not be permitted. The cover screws must be appropriate in size, non-corrodible and not less than four (4) in number for each box opening.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 ELECTRICAL WIRING DEVICES:

A. WALL SWITCHES: must be of the best specification grade, quiet type, and must have a rating of 20 Amperes at 277 volts, as manufactured by Bryant, Hubbell or approved equal. The mechanism must be equipped with arc snuffers. They must be of the tumbler type, single pole. Switches of the 3-way type must have a similar rating.

B. RECEPTACLES:

1. CONVENIENCE OUTLETS: must be of the best specification grade, duplex, two-pole, 3-wire, 20 Amperes at 125 volts. It must have a grounding pole that must be grounded to the conduit system. Receptacles must be capable of both back and side wiring and must have only one (1) grounding screw. Receptacles must be Hubbell Catalog #5262 or approved equal.

2. HEAVY DUTY RECEPTACLE OUTLETS: must have the Ampere rating and the number of poles specified on the Contract Drawings and must be Hubbell, Russell-Stoll, Bryant, AH & H or approved equal. Each outlet must have a grounding pole, which must be grounded to the conduit system.

3. FLOOR RECEPTACLES: must be Russell & Stoll #3040 or approved equal, to fit into floor box previously specified.

4. NAMEPLATES: are required for all receptacles other than 120V.

C. CLOCK HANGERS: Clock outlets for surface type clocks must be equipped with a supporting hook and recessed faceplate to conceal the electrical cord.

D. WATERTIGHT DEVICES: For installations exposed to weather or in damp locations, the devices must be in a gasketed, cast iron enclosure.

E. PLATES:

1. Every convenience outlet and switch outlet must be covered by means of a stainless steel No. 302 - 0.4" antimagnetic plate with an approved finish, unless provided otherwise in the detailed Specifications.

2. Where two (2) or three (3) switches are grouped together, a single faceplate must be used. Where more than three (3) switches are located at one (1) point, the faceplates may be made up in multiple units.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4

3.4 ELECTRICAL CONDUCTORS AND TERMINATIONS:

A. CONDUCTORS FOR LIGHT AND POWER: All wire and cable must be of annealed copper of 98% conductivity. Aluminum wire or cable will not be permitted. The insulation must be flame retardant, moisture and heat resistant, thermoplastic, type THW or THWN rated for 600 volts at 75 degrees Celsius (C.) for both wet and dry locations. Wires No. 8 or larger must be stranded. Wires and cables must also

be subject to the requirements of the NYCEC. Cables for incoming service, or wire in conduits contiguous with the earth, in concrete, or other damp or wet locations, must be synthetic rubber insulated with neoprene jacket, heat and moisture resistant and must be equal to UL Type USE and rated for 600 volts at 75 degrees C. for both wet and dry locations.

B. FIXTURE WIRE: Lighting fixtures must be wired with No. 14 gauge wire designated as AWM and rated at 105 degrees C.

C. OTHER TYPES: Cables and wires for interior communication systems are described in applicable detailed Specifications.

D. MINIMUM SIZE: Conductors smaller than No. 12 AWG must not be used for light or power.

E. COLOR CODE: Wires must have a phase color code, and multiple conductor cables must be color coded.

F. CABLE DATA: The Contractor must submit for approval the following information for each size and type of cable to be furnished:

1. Manufacture of Cable - Location of Plant.
2. Minimum insulation resistance at standard test temperature.
3. Days required for delivery to site of work after order to proceed with manufacture.

G. ORIGINAL REELS: Cable and wire must be delivered to the site of the work on original sealed factory reels.

H. WIRE INSTALLATION:

1. INSTALL WIRES AFTER PLASTERING: Feeder and branch circuits wiring must not be installed into conduit before the rough plastering work is completed. No conductors must be pulled into floor conduits before floor is poured.
2. CONDUIT SECURED IN PLACE: No conductor must be pulled into any conduit run before all joints are made up tightly and the entire run rigidly secured in place.
3. WIRE ENDS: All wires must be left with sufficiently long ends for proper connection and stowing.
4. PULLING COMPOUNDS: to ease the pulling-in of wires into the conduit, only approved compounds as recommended by cable manufacturers must be used.
5. PRESSURE CONNECTORS: pressure connectors for wires must be of the cast copper or forged copper pressure plate type. Connectors must be O.Z., Burndy, National Electric Products or approved equal.
6. Splices and feeder taps in the gutters of panel boxes must be made by means of pressure plate-type connectors encased in composition covers as manufactured by O.Z., Burndy, National Electric Products or approved equal.
7. Splices in branch wiring for sound systems and fire systems, must be first made mechanically secure, then soldered and taped.
8. In lieu of soldered splices (except for sound and fire systems, which must have soldered splices) the following alternates are acceptable for operating temperatures up to 105 degrees C., for fluorescent fixtures and for the splicing of branch circuit wiring up to No. 8 AWG wire:
    a. Mechanical splices made with mechanical connectors as manufactured by the Minnesota Manufacturing Company "Scotchlock" or approved equal. Mechanical connectors requiring a special tool (pressure connectors, insulators and locking rings) by Buchanan or approved equal. The tool used for connector application must be as approved by the connector manufacturer.

b. For branch circuit wire and cable No. 6 AWG and larger, the seamless tubular connector will only be accepted. Application of this connector must be with a tool recommended by the connector manufacturer.

9. TAGS: All feeders and risers must be tagged at both ends, and in all pull and junction boxes and gutter spaces through which they pass. Such tags must be of fiber and have the feeder designation and size stamped thereon.

10. BRANCH CIRCUIT WIRING:

a. The Contractor installing branch circuit wiring must test the work for correct connections and leave all loop splices in the fixture outlet boxes properly spliced and taped. The Contractor must provide wire ends long enough for convenient connection to device.

b. NEUTRALS: No common neutrals must be used except for lighting branch circuits. Each neutral wire must be terminated separately on a neutral busbar in the panelboard. No common neutrals will be permitted for convenience receptacle branch circuits.

I. TERMINATIONS

1. LUGS: All lugs for all devices and all cable terminations must be copper. AL/CU rated lugs will not be permitted. The only exception to this requirement is when the particular device is not manufactured with copper lugs by any manufacturer. Lugs for No. 6 AWG cable and larger must be cast copper or forged copper pressure plate type. Lugs for 1/0 and larger must be fastened with two (2) bolts.

2. All lugs must be of the proper size to accept the cable connected to them. Any subcontractor furnishing a device containing lugs is to coordinate with the Contractor to ensure that the device terminations are adequate for the wire or cable (whose size may be larger than expected due to voltage drop considerations) connected to the device.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.5

3.5 CIRCUIT PROTECTIVE DEVICES:

This Section sets forth the circuit protective devices such as circuit breakers and safety switches, used in connection with Motor Control Equipment, Distribution Centers, Panel boards and Service Entrance.

A. CIRCUIT BREAKERS:

1. CIRCUIT BREAKERS: must be operable in any position and must be of the quick-make, quick-break type on manual operation. The handle must be trip free, preventing contacts from being held in closed position against abnormal overloads or short circuits. Positive visual indication of automatic tripped position of breaker must be provided, in addition to the "On" and "Off" indication. All circuit breakers must be of the bolted type.

2. TRIP RATING: Circuit breakers must be provided with the required number of trip elements, calibrated at 40 degrees C., ambient temperature, in accordance with wire sizes or motor currents as shown on Contract Drawings or indicated in the Specifications.

3. POLE BARRIER: Multipole pole breakers must be designed to break all poles simultaneously. They must be provided with barriers between poles and arc suppressing devices.

4. ELEMENTS: Multipole circuit breakers must have frames of not less than a 100 Ampere rating. Multipole circuit breakers for 480 volts AC operation must have an NEMA interrupting rating of 18,000 Amperes, unless a higher rating is specified in the Specifications or indicated on the Contract Drawings.

5. For circuit breakers with frame size up to and including 225 Amperes, the breakers may be

provided with non-interchangeable trip elements. For frame ratings above 225 Amperes, the breakers must be provided with interchangeable trip elements, which can be replaced readily.

6. Single pole circuit breakers for branch circuits must have a frame size of no less than 100 Amperes, and must be rated at 125 volt A.C. with a NEMA interrupting rating of 10,000 Amperes, unless a higher rating is specified in the Specifications or indicated on the Contract Drawings.

7. INVERSE TIME ACTION: The circuit breakers must be dual element type, one (1) element with time limit characteristics, so that tripping will be prevented on momentary overloads, but will occur before dangerous values are reached and the other with instantaneous trip action. Inverse time delay action must be effective between a minimum tripping point of 125% of rating of breaker and an instantaneous tripping point between 600% and 700% of rated current.

8. CONSTANCY OF CALIBRATION: The tripping elements must insure constant calibration and be capable of withstanding excessive short circuit conditions without injury.

9. CONTACTS: must be non-welding under operating conditions and of the silver to silver type.

10. TEMPERATURE RISE: Current carrying parts, except thermal elements, must not rise in temperature in excess of 30 degrees C. while carrying current at the part's rated current and frequency.

11. NUMBERING: Each circuit breaker must be distinctly numbered when installed in a group with other breakers. The calibration of trip element must be indicated on each breaker.

B. SAFETY SWITCHES:

NEMA TYPE HD: When safety switches are permitted to be used for service entrance, motor disconnecting means or to control other types of electrical equipment, they must be of the type HD of a rating not less than 30 Amperes. Enclosures must be provided with means for locking. For ratings above 60 Amperes terminals must have double studs.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.6

3.6 DISTRIBUTION CENTERS:

This Section sets forth the construction and installation procedure for Switchboards, Panel boards and Cabinets.

A. PANEL BOARDS, GENERAL TYPE: The panel boards must be of the automatic circuit breaker type with individual breakers for each circuit, removable without disturbing the other units. Circuit breakers must be in accordance with the requirements outlined under Section 3.5, "Circuit Protective Devices."

B. NUMBER AND RATING OF CIRCUIT BREAKERS: The Contract Drawings show a layout of each panel, giving the number, frame, size and trip setting of circuit breakers and number of branch circuits and spare breakers. Each branch circuit must be distinctly numbered.

C. BUS BAR CONSTRUCTION AND SUPPORT: Panel Boards must be of the dead front type and must have bus bars and branch circuits designed to suit the system and voltage. Current carrying parts, exclusive of circuit breakers, must be copper and based on a maximum density of 1,000 Amperes per square inch. Bus bars for the main switchboard must be designed for the frame rating of the Service Breaker. Bus bars must run up the center of the panel, unless otherwise indicated, and must have connected thereto the various branch circuits. Unless otherwise specified, bus bars for each panel board must be equipped with main lugs only and capacity as required on Contract Drawings. Where main protection is required, automatic circuit breakers must be used. A neutral bus of at least the same capacity as a live bus bar must be provided for the connection of all neutral conductors. Each terminal must be identified. All current carrying parts, exclusive of circuit breakers, must be of copper with a minimum number of joints. The bus bar structure must be a self-supporting unit, firmly fastened to a ½

inch plastic board, extending the full length and width of assembly which must serve to insulate the bus structure from the back of panel box. Other methods affording equally effective bus structure support and insulation will be given consideration. An insulating barrier must separate neutral bus from other parts of panel.

D. CIRCUIT BREAKER ASSEMBLY: The entire circuit breaker and bus bar assembly must be mounted on an adjustable metal base or pan and secured to the back of the panel box. The panel must have edges flanged for rigidity.

E. PANEL MOUNTING: The panel must be centered in the panel box, line up with the door openings, be set level and plumb, and no live parts may be exposed with the door open.

F. PANEL CABINET:

1. PANEL CABINET INSTALLATION: When installed, surface mounted in panel closets must be mounted on Kindorf channel.

2. Where cabinets cannot be set entirely flush due to mustow walls or partitions or where cabinet is extra deep, the protruding sides of cabinet must be trimmed with a metal or hardwood return molding of approved design and fastened to cabinet so as to conceal the intersection between the wall and cabinet.

G. NAMEPLATES: Where required, nameplates must be made of engraved Lamicoid sheet, or approved equal. Letters and numbers must be engraved white on a black background (except for Firehouse projects which must have white letters on a red background). The Contractor must submit an engraved sample for approval as to design and style of lettering before proceeding with the manufacture of the nameplate. Nameplates must be of suitable size and must also be provided at the top of the switchboard or section thereof and on the trim at the top of all lighting and power panels. Similar nameplates must also be provided for each distribution circuit breaker giving the breaker number, the number of the feeder, and the name of the equipment fed.

H. SHOP DRAWINGS: showing all details of boxes, panels, etc., must be submitted for approval.

I. DIRECTORIES: A directory must be fastened with brass screws and consist of a noncorrosive metal frame with dimensions not less than five (5) inches x eight (8) inches and a transparent window of Plasticile, Plexiglass, Lucite, Polycarbonate or approved equal that is not less than 1/16 inch thick over cardboard or heavy paper. The directory must be typewritten and show the number and name of each circuit, and lighting or equipment supplied. The size of riser feeder must be as indicated on the directory. The dimensions of the directory must be submitted for approval for each size of panel.

J. CONSTRUCTION

1. FINISH: Panel boxes, doors and trim for installation in dry locations, must be zinc coated after fabrication by the hot-dip galvanizing or electroplate process on inside and outside surfaces. In damp locations, panel boards must be enclosed and gasketed NEMA 3R type. Panel boards located outdoors or exposed to the weather must be NEMA 3X type.

2. PAINTING: Panel boxes, doors and trim must receive a coat of approved priming paint and a second coat of approved paint in the field after installation. Paint must be applied to the inside and outside of boxes and on both sides of trim. Panel trims and doors must receive a third or finishing coat on the outside after installation. Approval as to texture and color must be obtained before the final coat is applied.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.7

3.7 MOTORS:

This Section sets forth the general design, construction and performance requirements, which must apply to all motors furnished in the Contract.

A. MOTOR DESIGN: All motors must be designed to comply with the New York State Energy Conservation Construction Code and the New York City Energy Conservation Code. In the event of any conflict or inconsistency between such codes, the New York City Energy Conservation Code must prevail. Motors must have standard NEMA frames and must have nameplate ratings adequate to meet the specified conditions of operation. Motor performance under variable conditions of voltage and frequency must be within the limits set in NEMA standards, unless modified in the Specifications. Motors must be expressly designed for the hazard duty load, voltage and frequency as specified in the Contract. All motor windings must be copper. All motors intended to operate on a 208 volt system must be designed and rated for 200 volts.

B. STANDARDS OF COMPARISON: In the absence of specific motor specifications, in general, the best standard products of the leading motor manufacturers must be considered as a standard for comparison. The requirements of the NEMA standards for motors and generators must be deemed to contain the minimum requirements of performance and design.

C. OBJECTIONABLE NOISES: Objectionable noises will not be tolerated and exceptionally quiet motors may be required for certain specified locations. Noise control tests as per the New York City Construction Codes may be performed as directed by the Commissioner. Such motors must bear a nameplate lettered "Quiet Motor." Springs and slip rings must be of approved non-ferrous material.

D. BEARINGS:

1. Bearings, unless specified otherwise, must be of the ball or roller type. Motors one (1) horsepower and larger that are equipped with ball roller bearings must also have lubrication of the pressure-relief greasing type. The Contractor furnishing four (4) or more such motors must also furnish, as part of the Contract, a pressure grease gun of rugged design, of approximately ten (10) ounce capacity, complete with necessary adapters. The Contractor must also provide ten (10) pounds of approved gun grease.

2. For any particular unit where sleeve bearings are deemed desirable, permission for their use may be granted by the Commissioner. Motors one (1) horsepower and larger that are equipped with sleeve type bearings must, in addition to having protected fittings easily accessed for oiling, be provided with visible means for determining normal oil level. Lubrication must be positive, automatic and continuous.

E. MOTOR TERMINALS AND BOXES: Each motor must be furnished with flexible leads of sufficient length to extend for a distance of not less than three (3) inches beyond the face of the conduit terminal box. This box must be furnished of ample size to make and house motor connections. These requirements must be met irrespective of any other standards or practices. Size of cable terminals and conduit terminal box holes must be subject to approval. For motors five (5) horsepower or larger, each terminal must come with two (2) cast or forged copper pressure type connectors with bolts, nuts and washers. For motors of smaller ratings, connectors of other acceptable types may be furnished. For installations exposed to the weather or moist locations, terminal boxes must be of cast iron with threaded hubs and gasketed covers. Cover screws must be of non-corrosive material.

F. MOTOR TEMPERATURE RISES: The motor nameplate temperature rises for the various types of motor enclosures must be as listed below:

1.	Open Frame	40 degrees C.
2.	Totally enclosed and enclosed fan cooled	55 degrees C.
3.	Explosion proof and submersible	55 degrees C.

4. Partially enclosed and drip proof 40 degrees C.

The temperature of the various parts of a motor must meet the requirements of NEMA standards for the size and type of the motors. Tests for heating must be made by loading the motor to its rated horsepower and keeping it so loaded for the rated time interval or until the temperature becomes constant.

G. SPECIAL CODE INSTALLATIONS: Electrical installations covered by special publications of NBFU and by special City rulings and regulations must comply in design and safety features with such applicable codes, regulations and rulings, and must be furnished and installed complete with all accessories and safety devices as therein specified.

H. MOTORS ON LIGHTING PANELS: The largest A.C. motor permitted on branch circuits of lighting panels must not exceed 1/4 horsepower.

I. MOTORS RATED: ½ horsepower and larger must be polyphase.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8

3.8 MOTOR CONTROL EQUIPMENT:

This Section sets forth the requirements for motor controllers and associated devices. Such requirements are applicable to all motor control equipment furnished or installed.

A. MANUFACTURER: All control equipment furnished under the Contract must be the product of a single manufacturer. Exceptions to this rule may be granted in the case of controllers for fractional horsepower motors driving special equipment, the various units of which have been engineered to obtain specific performance.

B. CONTROL ITEMS REQUIRED: The Contractor furnishing motors must also furnish therewith complete disconnecting, starting and control equipment as required by the detailed Specifications, the various code authorities and for the successful operation of the driven equipment. These items include circuit breakers, magnetic starters with overload protection and low voltage release or protection, push button stations, pilot lights and alarms, float, pressure, temperature and limit switches, load transfer switches, devices for manual operation and speed controllers, etc. The Contractor must furnish as many of these items as required for the successful operation of the driven unit.

1. Where a motor is to be located out of sight of the controller, the Contractor must furnish an approved disconnecting means to be mounted near motor.

C. TYPES OF STARTERS:

1. SQUIRREL CAGE: A.C. motors of the squirrel cage type, rated from one (1) to thirty (30) horsepower, must have magnetic across the line starters; motors rated above thirty (30) horsepower must be furnished with reduced voltage (autotransformer type) starter or part winding start with time delay to reduce inrush current. Size of starters must be based on 200V operation.

2. SLIP RING: A.C. motors of the slip-ring type must be furnished with primary across the line starters interlocked with secondary starting and regulating equipment. The interlocking feature must prevent starting of the motor when the secondary controller is off the initial starting point.

3. MAGNETIC: For fractional horsepower motors, magnetic type starters are not required unless the particular method of controlling the driven equipment makes them necessary. Where individual single phase fractional horsepower motors or the sum of fractional horsepower motors controlled by an automatic device are ½ horsepower or more, magnetic starters and circuit breakers must be used. Single phase A.C. motors smaller than ½ horsepower or three-phase A.C. motors smaller than one (1) horsepower where manual control is specified may be furnished with starters of toggle switch or push button type with inbuilt thermal protection. No additional disconnecting means is required to be furnished with this type of starter. This type of starter may also be used in series

with automatic control devices such as thermostats, float and pressure switches, provided the individual motor or the sum of fractional horsepower motors is less than ½ horsepower. Means for manual operation must be provided.

D. DISCONNECTING BREAKER: All motor starters, unless otherwise specified, must be provided with a disconnecting means in the form of a circuit breaker of the type specified under Article 3.5 CIRCUIT PROTECTIVE DEVICES. This disconnecting means must be contained in the same housing with the starter and must be operable from outside. Means must be provided for locking the handle of the circuit breaker in the "OFF" position if it is desired to take the equipment out of service and prevent unauthorized starting.

E. CONTROL CABINET – DRY LOCATIONS: All starters must be furnished with general purpose, NEMA Type 1, sheet metal enclosures with hinged covers and baked enamel finish.

F. CONTROL CABINET – WATERTIGHT: In wet locations, cast iron watertight enclosures with threaded hubs, galvanized and gasketed hinged covers must be provided.

G. PANELS: Motor control devices and appliances must be mounted on approved insulating slabs with all wiring and connections made on the back of the slabs.

H. WIRING AND TERMINALS: Wiring connections for currents of one hundred (100) Amperes or less may be made with copper wire or cable with special flameproof insulating coverings. Such wires must be installed in a neat workmanlike manner, flat against the slab, and held in place by clips. Connections must be made with pressure connectors for No. 8 AWG and larger wires, and with grommets for small stranded wires. Except for incoming and outgoing main leads, all connections must terminate on approved connector blocks, which may be installed on the face of the slab. For small, across the line starters, the above requirements may be modified if satisfactory connections are provided.

I. COPPER BUS: For currents exceeding one hundred (100) Amperes, copper bus must be used in place of wires. The bus must be constructed of copper rods, tubing or flat strap, bent and shaped properly and securely attached to the slab in a neat and workmanlike manner. The cross section of copper must provide sufficient areas to keep current density at not more than one thousand (1,000) Amperes per square inch.

J. COOPERATION: The Contractor’s subcontractor(s) who furnish electrically operated equipment must give to the Contractor and the Contractor’s electrical subcontractor full information relative to sizes and locations of apparatus furnished by them which require electrical connections.

END OF SECTION 01 35 06

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SECTION 01 35 26
SAFETY REQUIREMENTS PROCEDURES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. The Contractor shall comply with the requirements of "*The City of New York Department of Design and Construction Safety Requirements".* This document is included in the Information for Bidders.

1.2 SUMMARY:

A. This Section includes administrative and general procedural requirements for Safety and Health Requirements, including:

1. Definitions
2. Required Safety Meeting
3. Compliance with Regulations
4. Submittals
5. Personnel Protective Equipment
6. Hazardous and / or Contaminated Materials
7. Emergency Suspension of Work
8. Protection of Personnel
9. Environmental Protection

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 REQUIRED SAFETY MEETINGS:

A. Prior to commencing construction, the Resident Engineer will schedule and hold a preconstruction kick-off meeting either at DDC's main office or at the Project site with representatives of the Contractor, including the principal on-site project representative, one or more safety representatives, the Commissioner's designated representatives and other concerned parties for the purpose of reviewing the Contract safety requirements. Additionally, implementing Work safety provisions must be discussed.

B. The Contractor is responsible for conducting weekly documented jobsite safety meetings, given to all jobsite personnel including all subcontractors on the Project, with the purpose of discussing safety topics and job-specific requirements at the DDC worksite.

1.5 COMPLIANCE WITH REGULATIONS:

A. The Work, including contact with or handling of hazardous materials, disturbance or dismantling of structures containing hazardous materials, and disposal of hazardous materials, shall comply with the applicable requirement for 29 CFR Parts 1910 and 1926, and 40 CFR, Parts 61, 261, 761 and 763.

B. Work involving disturbance or dismantling of asbestos or asbestos-containing materials, demolition of structures containing asbestos and removal of asbestos, shall comply with 40 CFR Part 61, Subparts A and M, and 40 CFR Part 763, as applicable.

C. Additionally, Work shall comply with all applicable federal, state, and local safety and health regulations.

D. In case of a conflict between applicable regulations, the more stringent requirements shall apply.

E. All workers working on the DDC Project site are required by NYC Local Law 41 to complete the OSHA 10-hour training course.

1.6 SUBMITTALS:

A. The Contractor shall submit to the Resident Engineer, copies of the Safety Program, Site Safety Plan and other required documentation in accordance with the "*New York City Department of Design and Construction Safety Requirements*".

B. Permits: If hazardous materials are disposed of off-site, the Contractor must submit to the Resident Engineer copies of shipping manifests, permits from applicable federal, state, or local authorities and disposal facilities, and certificates that the material has been disposed of in accordance with regulations.

C. Accident Reporting: Submit a copy of each accident report to the Resident Engineer in accordance with the "*New York City Department of Design and Construction Safety Requirements*".

D. All asbestos and lead project regulatory notifications are to be submitted to DDC's Office of Environmental and HazMat Services (OEHS) through the Resident Engineer.

E. Request for Subcontractor Approval: Any subcontractor performing environmental work must submit required documentation for approval to perform such work as required by DDC's OEHS.

PART II – PRODUCTS

2.1 PERSONNEL PROTECTIVE EQUIPMENT:

A. Special facilities, devices, equipment, and similar items used by the Contractor in execution of the Work shall comply with 29 CFR Part 1910, subpart I, Part 1926, subpart E, and other applicable regulations.

2.2 HAZARDOUS AND / OR CONTAMINATED MATERIALS:

A. The Contractor shall bring to the attention of the Commissioner, any material encountered during execution of the Work that the Contractor suspects to be hazardous and / or contaminated.

B. The Commissioner shall determine whether the Contractor shall perform tests to determine if the material is hazardous and / or contaminated. A change to the Contract price may be provided, subject to the applicable provisions of the Contract.

C. If the material is found to be hazardous, the Commissioner may direct the Contractor to remediate the hazard and a change to the Contract price may be provided, subject to the applicable provisions of the Contract.

PART III – EXECUTION

3.1 EMERGENCY SUSPENSION OF WORK:

A. When the Contractor is notified by the Commissioner of noncompliance with the safety provisions of the Contract, the Contractor shall immediately, unless otherwise instructed, correct the unsafe condition, at no additional cost to the City.

B. If the Contractor fails to comply promptly, all or part of the Work may be stopped by notice from the Commissioner.

C. When, in the opinion of the Commissioner, the Contractor has taken satisfactory corrective action, the Commissioner shall provide written notice to the Contractor that the Work may resume.

D. The Contractor shall not be allowed any extension of time or compensation for damages in connection with a work stoppage for an unsafe condition.

3.2 PROTECTION OF PERSONNEL:

A. The Contractor shall take all necessary precautions to prevent injury to the public, occupants, or damage to property of others. The public and occupants includes all persons not employed by the Contractor or a subcontractor.

B. Whenever practical, the work area shall be fenced, barricaded, or otherwise blocked off from the public or occupants to prevent unauthorized entry into the work area, in compliance with the requirements of Section 01 50 00 TEMPORARY FACILITIES, SERVICES AND CONTROLS, and including without limitation, the following:

1. Provide traffic barricades and traffic control signage where construction activities occur in vehicular areas.
2. Corridors, aisles, stairways, doors, and exit ways shall not be obstructed or used in a manner to encroach upon routes of ingress or egress utilized by the public or occupants, or to present an unsafe condition to the public or occupants.
3. Store, position and use equipment, tools, materials, scraps and trash in a manner that does not present a hazard to the public or occupant by accidental shifting, ignition, or other hazardous activity.
4. Store and transport refuse and debris in a manner to prevent unsafe and unhealthy conditions for the public and occupants. Cover refuse containers and remove refuse on a frequent regular basis acceptable to the Resident Engineer. Use tarpaulins or other means to prevent loose transported materials from dropping from trucks or other vehicles.

3.3 ENVIRONMENTAL PROTECTION:

A. Dispose of solid, liquid and gaseous contaminants in accordance with local codes, laws, ordinances and regulations.

B. Comply with applicable federal, state, and local noise control laws, ordinances, and regulations, including but not limited to 29 CFR 1910.95, 29 CFR 1926.52 and NYC Administrative Code Chapter 28 of Title 15.

END OF SECTION 01 35 26

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SECTION 01 35 91
HISTORIC TREATMENT PROCEDURES

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 35 91

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes administrative and procedural requirements for the treatment of Landmark Structures and Landmark Quality Structures, as identified in the Addendum. Specific requirements are indicated in other sections of the Specifications.

B. This Section includes, without limitation, the following:

1. Storage and protection of existing historic materials
2. General Protection
3. Protection during use of heat-generating equipment
4. Photographic Documentation
5. NYC Landmarks Preservation Commission Final Approval signoffs

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION
C. Section 01 33 00 SUBMITTAL PROCEDURES
D. Section 01 77 00 CLOSEOUT PROCEDURES
E. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

C. Landmark Structure or Site: Any building or site which has been designated as a landmark, or any building or site within a landmark district, as designated by the New York City (NYC) Preservation Commission or the New York State Historic Preservation Office.

D. Landmark Quality Structure: Any building which has been determined by the City to be of landmark quality and/or historical significance.

E. Preservation: To apply measures necessary to sustain the existing form, integrity, and materials of a historic property. Work may include preliminary measures to protect and stabilize the property.

F. Rehabilitation: To make possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.

G. Restoration: To accurately depict the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and the reconstruction of missing features from the restoration period.

H. Reconstruction: To reproduce in the exact form and detail a building, structure, or artifact as it appeared at a specific period in time.

I. Stabilize: To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of the building while maintaining the essential form as it exists at present.

J. Protect and Maintain: To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.

K. Repair: To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of features when there are surviving prototypes.

L. Replace: To duplicate and replace entire features with new material in kind. Replacement includes the following conditions:

1. Duplication: Includes replacing elements damaged beyond repair or missing. Original material is indicated as the pattern for creating new duplicated elements.
2. Replacement with New Materials: Includes replacement with new material when original material is not available as patterns for creating new duplicated elements.
3. Replacement with Substitute Materials: Includes replacement with compatible substitute materials. Substitute materials are not allowed, unless otherwise indicated.

M. Remove: To detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

N. Remove and Salvage: To detach items from existing construction and deliver them to the City ready for reuse.

O. Remove and Reinstall: To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.

P. Existing to Remain or Retain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.

Q. Material in Kind: Material that matches existing materials as much as possible, in species, cut, color, grain, and finish.

1.5 SUBMITTALS:

A. Historic Treatment Program: Submit a written plan for each phase or process, including protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of the Work.

B. Alternative Methods and Materials: If alternative methods and materials to those indicated are proposed for any phase of the Work, submit for the Commissioner’s approval a written description, including

evidence of successful use on other comparable projects and provide a program of planned testing to demonstrate the effectiveness of the alternative methods and materials for use on this Project.

C. Qualification Data: Submit qualification data for historic treatment specialists as specified and required by individual sections of the Project specifications.

D. Photographs for Designated Landmark Structures: Submit photographs in accordance with Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION and as described in this section.

E. Record Documents: Include modifications to manufacturer's written instructions and procedures, as documented in the historic treatment preconstruction conference and as the Work progresses.

1.6 QUALITY ASSURANCE:

A. Historic Treatment Specialist Qualifications: Refer to Section 01 40 00 QUALITY REQUIREMENTS for Qualifications for Historic Treatment Specialists.

B. Historic Treatment Preconstruction Conference: The Resident Engineer will schedule and hold a preconstruction meeting at the site in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION.

1. Review manufacturer's written instructions for precautions and effects of products and procedures on building materials, components, and vegetation.

a. Record procedures established as a result of the review and distribute to affected parties.

1.7 STORAGE AND PROTECTION OF HISTORIC MATERIALS:

A. Removed and Salvaged Historic Materials: As specified and required by individual sections of the Project specifications.

B. Removed and Reinstalled Historic Materials: As specified and required by individual sections of the Project specifications.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling during historic treatment. When permitted by the Commissioner, items may be removed to a suitable, protected storage location during historic treatment and reinstalled in their original locations after historic treatment operations are complete.

D. Storage and Protection: When removed from their existing location, store historic materials, at a location acceptable to the Commissioner, within a weather tight enclosure where they are protected from wetting by rain, snow, or ground water, and temperature variations. Secure stored materials to protect from theft.

1. Identify removed items with an inconspicuous mark indicating their original location.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 GENERAL PROTECTION:

A. Comply with manufacturer's written precautions against harmful effects of products and procedures on adjacent building materials, components, and vegetation.

B. Ensure that supervisory personnel are present when work begins and throughout its progress.

C. Temporary Protection of Historic Materials during Construction:

1. Protect existing materials during installation of temporary protections and construction. Do not deface or remove existing materials.

2. Attachments of temporary protection to existing construction must be approved by the Commissioner prior to installation.

D. Protect landscape work adjacent to or within work areas as follows:

1. Provide barriers to protect tree trunks.

2. Bind spreading shrubs.

3. Use coverings that allow plants to breathe and remove coverings at the end of each day. Do not cover plant material with a waterproof membrane for more than eight (8) hours at a time.

4. Set scaffolding and ladder legs away from plants.

E. Existing Drains: Prior to the start of work or any cleaning operations, test drains and other water removal systems to ensure that drains and systems are functioning properly. Notify the Commissioner immediately of drains or systems that are stopped or blocked. Do not begin Work pertaining to this Section until the drains are in working order.

1. Provide a method to prevent solids, including stone or mortar residue, from entering the drains or drain lines. Clean out drains and drain lines that become blocked or filled by sand or any other solids because of the Work performed under this Contract.

2. Protect storm drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION DURING USE OF HEAT-GENERATING EQUIPMENT:

A. No roofing work requiring the use of an open flame will be permitted on any Landmark Structure or any Landmark Quality Structure whose roof or wall structure is made of wood or primarily of wood.

B. Comply with the following procedures while performing work with heat-generating equipment, including welding, cutting, soldering, brazing, paint removal with heat, and other operations where open flames or implements utilizing heat are used:

1. Obtain Commissioner’s approval for operations involving use of open-flame or welding equipment. Notification must be given for each occurrence and location of work with heat-generating equipment.

2. Where possible, use heat-generating equipment in shop areas or outside the building.

3. Before work with heat-generating equipment commences, furnish personnel to serve as a fire watch (or watches) for location(s) where work is to be performed.

4. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.

5. Remove and keep the area free of combustibles, including rubbish, paper, waste, etc., within the area of operations.

6. If combustible material cannot be removed, provide fireproof blankets to cover such materials.

7. Where possible, furnish and use baffles of metal or gypsum board to prevent the spraying of sparks or hot slag into surrounding combustible material.

8. Prevent the extension of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.

9. Inspect each location of the day's work not sooner than thirty (30) minutes after completion of operations to detect hidden or smoldering fires and to ensure that proper housekeeping is maintained.

C. Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to automatic sprinkler heads, shield the individual heads temporarily with guards.

3.3 PHOTOGRAPHIC DOCUMENTATION:

A. Photographs for Designated Landmark Structures: Show existing conditions prior to any historic treatments, including one overall photograph and two close-up photographs of all areas of work affected. Show one overall photograph and two close-up photographs of all areas of work after the successful execution of all historical treatments.

3.4 NEW YORK CITY LANDMARKS PRESERVATION COMMISSION FINAL APPROVALS SIGNOFF:

A. For all projects involving a Landmark Structure or Site, the Contractor, at the completion of the Work, must submit to the Commissioner, in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS, all documentation concerning the successful execution of all historic treatments. This must include, but not be limited to, copies of all before and after photographs of historic treatments, one copy of the Contractor's as-built drawings, copies of testing and analysis results, including cleaning, mortar analysis, pointing mortars and all other information pertaining to work performed under the NYC Landmarks Preservation Commission jurisdiction.

END OF SECTION 01 35 91

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SECTION 01 40 00
QUALITY REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes the following:

1. Definitions
2. Engineering Services
3. Conflicting Requirements
4. Quality Assurance
5. Quality Control
6. Approval of Materials
7. Special Inspections (Controlled Inspection)
8. Inspections by Other City Agencies
9. Certificates of Approval
10. Acceptance Tests
11. Repair and Protection

B. This section includes administrative and procedural requirements for quality control to assure compliance with quality requirements specified in the Contract Documents.

C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Documents.

D. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with the Contract Documents.

E. Provisions of this section do not limit requirements for the Contractor to provide quality assurance and quality control services required by the Commissioner or authorities having jurisdiction.

F. Specific test and inspection requirements are specified in the individual sections of the Specifications.

G. LEED: Refer to the Addendum to identify whether the Project is designed to comply with a Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

H. COMMISSIONING: Refer to the Addendum to identify whether the Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and/ or Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE. The Contractor must cooperate with the Commissioning Agent and provide whatever assistance is required.

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY

B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION

C. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

D. Section 01 33 00 SUBMITTAL PROCEDURES

E. Section 01 77 00 CLOSEOUT PROCEDURES

F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (Drawings and Specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

C. Commissioning: A Total Quality Assurance process that includes checking the design and installation of equipment, as well as performing functional testing of the same to confirm that the installed equipment is operating and in conformance with the Contract Documents and the City’s requirements.

D. Installer/ Applicator/ Erector: Contractor or another entity engaged by Contractor as an employee or Subcontractor, to perform a particular construction operation, installation, erection, application, assembly and similar operations.

E. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under sample Submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

F. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

G. Product Tests: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

H. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory means the same as testing agency.

J. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

K. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements.

1.5 ENGINEERING SERVICES

A. Performance and Design Criteria: Where professional design services provided by a professional engineer are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for clarification to the Commissioner.

1.6 CONFLICTING REQUIREMENTS:

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, the Contractor must comply with the most stringent requirement. The Contractor must refer any uncertainties and/or conflicting requirements to the Commissioner for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified must be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. The Contractor must refer any uncertainties to the Commissioner for a decision before proceeding.

1.7 QUALITY ASSURANCE:

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required. Individual Specification Sections may specify supplementary qualification requirements.

1. **Minimum Experience**: Minimum Experience qualification levels as described herein, apply to all entities indicated in the Specification Sections for the Project, unless such entity requires Special Experience requirements per Subsection 1.7 A.2. below. Individual Specification Sections may specify supplementary qualification requirements.

2. **Special Experience**: Special Experience qualification levels as described herein, apply to all entities indicated in the "Special Experience Requirements" page of the PASSPort procurement. Individual Specification Sections may specify supplementary qualification requirements.

B. **Minimum Experience qualification levels:**

1. **Qualifications for Installer or Applicator or Erector**: An entity complying with the requirements of authorities having jurisdiction and having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in installing, erecting, applying, or assembling work in a timely fashion similar in material, design, and extent to that indicated for the Project, and whose work has resulted in construction with a record of successful in-service performance.

2. **Qualifications for Installer or Applicator or Erector requiring approval or certification or authorization by Manufacturer**: An entity complying with the requirements of authorities having jurisdiction and having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in installing, erecting, applying, or assembling work in a timely fashion similar in material, design, and extent to that indicated for the Project, and whose work has resulted in construction with a record of successful in-service performance. In addition, the entity must be approved, or certified, or authorized by the manufacturers listed in the Specification Section and must be eligible to receive manufacturers' warranty.

3. **Qualifications for Fabricator**: An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in producing products similar to those indicated for the Project and having a record of successful in-service performance, as well as sufficient production capacity to produce required units.

4. **Qualifications for Manufacturer**: An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in manufacturing products or systems similar to those indicated for the Project; having a record of successful in-service performance for not less than three (3) consecutive years and having sufficient production capacity to produce required units. Manufacturer must meet warranty requirements and technical or factory-authorized service representative requirements.

5. **Qualifications for Specialist:** An entity complying with the requirements of authorities having jurisdiction; satisfying qualification requirements indicated in the Specification Section and having, prior to the bid opening, a minimum of three (3) consecutive years successfully engaged in the activities indicated.

C. **Special Experience Qualification Levels:**

1. **Special Qualifications for Installer or Applicator or Erector**: An entity complying with the requirements of authorities having jurisdiction and having, prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in successfully installing, erecting, applying, or assembling work similar in material and design to that indicated for the Project. Entity must provide documentation of having successfully completed a minimum of three (3) projects similar in scope, size and type as required for the Project.

2. **Special Qualifications for Fabricator**: An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in producing products similar to those indicated for the Project; having a record of successful in-service performance, as well as sufficient production capacity to produce required units. Entity must provide documentation of having successfully completed a minimum of three (3) projects similar in nature, size, and extent, to the requirements of the project.

3. **Special Qualifications for Installer of a Manufacturer-Warrantied Roof System:** An entity complying with the requirements of authorities having jurisdiction; regularly engaged in performing roofing projects with its own workforce; having successfully completed in a timely fashion within the last three (3) consecutive years prior to the bid opening, at least three (3) roofing projects similar in scope, size and type to the required Project, and having performed at least one (1) of those projects in the last twelve (12) months. The three (3) qualifying projects must have utilized one or more of the roofing systems specified for the project being bid herein, been installed by the entity utilizing its own workforce and must have qualified for, and have been issued, the warranty provided by the manufacturer of the roofing system. In addition, the entity

must be a certified or authorized installer for the manufacturer's roofing systems specified herein and must submit proof of same.

4. **Special Qualifications for Installer of Roof tie-in to maintain existing Roof System Warranty:** An entity complying with the requirements of authorities having jurisdiction; regularly engaged in performing roofing projects with its own workforce; having successfully completed in a timely fashion within the last three (3) consecutive years prior to the bid opening, at least three (3) roofing projects similar in scope, size and type to the required Project, and having performed at least one (1) of those projects in the last twelve (12) months. The three (3) qualifying projects must have utilized the manufacturer and manufacturer's Product, been installed by the entity utilizing its own workforce and must have qualified for, and have been issued, the warranty provided by the manufacturer listed in the technical specification. In addition, the entity must be a certified or authorized installer for this manufacturer's specified roofing system specified herein and must submit proof of same.

5. **Special Qualifications for Manufacturer:** An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in manufacturing products or systems similar to those indicated for the Project; having completed a minimum of three (3) projects similar in nature, size, and extent, to the requirements of the project; having a record of successful in-service performance, as well as sufficient production capacity to produce required units. Manufacturer must meet warranty requirements, and technical or factory-authorized service representative requirements.

6. **Special Qualifications for Historic Treatment Specialist:** An entity complying with the requirements of authorities having jurisdiction and having prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in successfully completing in a timely fashion projects similar in scope, size, and type to the required work, based on architectural style, construction method and materials and age of building for the project. Entity must provide documentation of having successfully completed a minimum of three (3) projects similar in scope, size and type as required for the Project, and where at least one (1) such prior project of the three (3) must have involved a landmarked building, as officially designated by the City, State, or Federal government.

D. Professional Engineer Qualifications: A professional engineer who is licensed and registered to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for the Project in material, design, and extent.

E. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for the Project.

F. Testing Agency Qualifications: A Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329 (Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection); and with additional qualifications specified in individual Specification Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

G. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens and test assemblies, and mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibility: Submit a certified written report of each test, inspection, and similar quality-assurance service to Commissioner, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by the Commissioner.
2. Notify Commissioner seven (7) days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Commissioner's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise directed or indicated.

I. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings or as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph in this Section.

J. Room Mockups: Construct room mockups according to approved Shop Drawings or as indicated on Drawings, incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Commissioner to evaluate quality of the Work. Comply with requirements in "Mockups" Paragraph in this Section.

K. Laboratory Mockups: Comply with the requirements of preconstruction testing and those specified in individual Specification Sections.

1.8 QUALITY CONTROL:

A. City's Responsibilities: Where quality-control services are indicated as the City's responsibility in the Specifications, the City will engage a qualified testing agency to perform these services. (Refer to Special Inspections Article 1.10.)

1. COST OF TESTS BORNE BY THE CITY: Where the City directs tests to be performed to determine compliance with the Specifications regarding materials or equipment, and where such compliance is ascertained as a result thereof, the City will bear the cost of such tests.
2. The City will furnish the Contractor with names, addresses, and telephone numbers of testing entities engaged and a description of the types of testing and inspecting they are engaged to perform.

3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to the Contractor.

B. Contractor's Responsibility: Tests and inspections not explicitly assigned to the City are the Contractor's responsibility. Unless otherwise indicated, the Contractor must provide quality control services as set forth in the Specifications and those required by authorities having jurisdiction, whether specified or not.

1. COST OF TESTS BORNE BY CONTRACTOR – In the case of tests which are specifically called for in the Specifications to be provided by the Contractor or tests which are required by any authority having jurisdiction, but are not indicated as the responsibility of the City, the cost thereof will be borne by the Contractor and will be deemed to be included in the Contract price. The Contractor must reimburse the City for expenditures incurred in providing tests on materials and equipment submitted by the Contractor as the equivalent of that specifically named in the Specifications and rejected for non-compliance.
2. Where services are indicated as Contractor's responsibility, the Contractor must engage a qualified testing agency to perform these quality-control services. Any testing agency engaged by the Contractor to perform quality control services is subject to prior approval by the Commissioner.
3. The Contractor must not employ same entity engaged by the City, unless agreed to in writing by the Commissioner.
4. The Contractor must notify testing agencies and the Commissioner at least 72 hours in advance of the date and time for the performance of Work that requires testing or inspecting.
5. Where quality control services are indicated as Contractor's responsibility, the Contractor must submit a certified written report of each quality-control service, in triplicate, to the Commissioner.
6. Testing and inspecting requested by the Contractor and not required by the Contract Documents are Contractor's responsibility.
7. The Contractor must submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, the Contractor must engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Results must be submitted in writing as specified in Section 01 33 00 SUBMITTAL PROCEDURES. Manufacturer's field representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether the original tests or inspections were the Contractor's responsibility, the Contractor must provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Commissioner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Commissioner and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

F. Associated Services: The Contractor must cooperate with entities performing required tests, inspections, and similar quality control services, and must provide reasonable auxiliary services as requested. The

Contractor must notify the testing agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist testing entity in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing entities.
6. Design mix proposed for use for material mixes that require control by the testing entity.
7. Security and protection for samples and for testing and inspecting equipment at the Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality control services with minimal delay and avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

2. Coordinate and cooperate with the Commissioning Authority/Agent as applicable for start-up, inspection and functional testing in the implementation of the Commissioning Plan.

H. Manufacturer’s Directions: Where the Specifications provide that the manufacturer's directions are to be used, such printed directions must be submitted to the Commissioner.

I. Inspection of Material: In the event that the Specifications require the Contractor to engage the services of an entity to witness and inspect any material especially manufactured or prepared for use in or part of the permanent construction, such entity will be subject to prior written approval by the Commissioner.

1. NOTICE - The Contractor must give notice in writing to the Commissioner, sufficiently in advance of its intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice must contain a request for inspection, the date of commencement, and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Commissioner will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials, or the Commissioner will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or the Commissioner will notify the Contractor that inspection will be waived.

J. No Shipping Before Inspection: The Contractor must comply with the foregoing before shipping any material.

K. Certificate of Manufacture: When the Commissioner so requires, the Contractor must furnish to the Commissioner, authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Specifications. These certificates must include copies of the results of physical tests and chemical analyses where necessary, that have been made directly on the product, or on similar products being fabricated by the manufacturer. This may include such approvals as the Bureau of Standards and Appeals (B.S.A.), the Materials and Equipment (M.E.A.) acceptance Index, the Bureau of Electrical Control (B.E.C.), etc.

L. Acceptance: When materials or manufactured products comprise of such quantity that it is not practical to make physical tests or chemical analyses directly on the product furnished, a certificate stating the results of such tests or analyses of similar materials which were concurrently produced may, at the discretion of the Commissioner, be considered as the basis for the acceptance of such material or manufactured product.

M. Testing Compliance: The testing personnel must make the necessary inspections and tests, and the reports thereof must be in such form as will facilitate checking to determine compliance with the Specifications, indicating thereon all analyses and/or test data and interpreted results thereof.

N. Reports: Reports in duplicate must be submitted and authoritative certification thereof must be furnished to the Commissioner as a prerequisite for the acceptance of any material or equipment.

O. Rejections: If, in making any test, it is ascertained by the Commissioner that the material or equipment does not comply with the Specifications, the Contractor will be notified thereof, and will be directed to refrain from delivering said materials or equipment, or to promptly remove it from the site or from the Work and replace it with acceptable material at no additional cost to the City.

P. Furnish Designated Materials: Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Specifications, the Contractor must immediately proceed to furnish the designated material or equipment.

1.9 APPROVAL OF MATERIALS:

A. Local Laws: All materials, appliances and types or methods of construction must be in accordance with the Specifications and must in no event be less than that necessary to conform to the requirements of the New York City (NYC) Construction Codes, Administrative Code and Charter of the City of New York.

B. Approval of Manufacturer: The names of proposed manufacturers, material suppliers, and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings must be submitted to the Commissioner for approval, as early as possible, to afford proper review and analysis. No manufacturer will be approved for any materials to be furnished under the Contract unless it has a plant of ample capacity and have successfully produced similar products. All approvals of materials or equipment that are legally required by the NYC Construction Codes and other governing authorities must be obtained prior to installation.

C. All Materials: Fixtures, fittings, supplies and equipment furnished under the Contract must be new and unused, except as approved by the Commissioner, and of standard first-grade quality and of the best workmanship and design. The City of New York encourages the use of recycled products where practical.

D. INFORMATION TO SUPPLIERS - In asking for prices on materials under any item of the Contract, the Contractor must provide the manufacturer or dealer with such complete information from the Specifications and Contract Drawings as may in any case be necessary, and in every case the Contractor must inform the manufacturer or dealer of all the General Conditions and requirements herein contained.

1.10 SPECIAL INSPECTIONS:

A. SPECIAL INSPECTIONS:

1. Inspection of selected materials, equipment, installation, fabrication, erection, or placement of components and connections made during the progress of the Work to ensure compliance with the Contract Documents and provisions of the NYC Construction Codes, will be made by a Special Inspector. The City of New York will retain the services of the Special Inspector and bear the costs for the performance of Special Inspections in compliance with NYC Construction Codes requirements or as additionally may be called for in the project specifications, except as noted below for Form TR-3: Technical Report for Concrete Design Mix. The Special Inspector will be an entity that is in compliance with the requirements of the NYC Construction Codes. The Contractor must notify the relevant Special Inspector in writing at least 72 hours before the commencement of any Work requiring special inspection.

2. Form TR3: Technical Report Concrete Design Mix: The Contractor will be responsible for, and bear all costs associated with the filing and securing of approvals, if any, for Form TR3: Technical Report Concrete Design Mix, including, but not limited to, engaging the services of a New York City licensed Concrete Testing Lab for the review and approval of concrete design mix, testing, signatures and professional seals, etc., compliant with NYC Department of Buildings requirements, for each concrete design mix.

3. The Contractor must notify the relevant Special Inspector in writing at least 72 hours before the commencement of any Work requiring Special Inspection. The Contractor will be responsible for and bear related costs to assure that all construction or work has suitable access and remains exposed for inspection purposes until the required inspection is completed.

4. Inspections and tests performed under "Special Inspection" will not relieve the Contractor of the responsibility to comply with the Contract Documents, and that there is no warranty given to the Contractor by the City of New York in connection with such inspection and tests or certifications made under "Special Inspections".

5. The Contractor must coordinate with the Resident Engineer or DDC Project Manager to provide access and schedule the Work for inspection by the Special Inspector.

1.11 INSPECTIONS BY OTHER CITY AGENCIES:

A. Letter of Completion: Just prior to Substantial Completion of the Project, the Commissioner will file with the Department of Buildings, an application for a Letter of Completion or a Certificate of Occupancy for the structure.

B. Final Inspections: In connection with the above-mentioned application for a Letter of Completion or a Certificate of Occupancy and before certificates of final payments are issued, the Contractor will be required to arrange for all final inspections by the inspection staff of the Department of Buildings, Fire Department, or other Governmental Agencies having jurisdiction, and secure all reports, sign offs, certificates, etc., by such inspection staff or other governmental agencies, in order that a Letter of Completion or Certificate of Occupancy can be issued promptly.

1.12 CERTIFICATES OF APPROVAL:

A. Responsibility: The Contractor will be responsible for and must obtain all final approvals for the Work installed under the Contract in the form of such certificates that are required by all governmental agencies having jurisdiction over the Work of the Contract.

B. Transmittal: All such certificates must be forwarded to the DDC.

1.13 ACCEPTANCE TESTS:

A. Government Agencies: All equipment and appliances furnished and installed under the Contract must conform to the requirements of the Specifications and will in no event be less than that necessary to comply with the minimum requirements of the law and all of the governmental agencies having jurisdiction.

B. Notice of Tests: Whenever the Specifications and/or any governmental agency having jurisdiction requires the acceptance test, the Contractor will give to all concerned, written notice of the time when these tests will be conducted.

C. Energy: The City will furnish all energy, fuel, water, and light required for tests.

D. Labor and Materials: The Contractor must furnish labor and all other material and instruments necessary to conduct the acceptance tests at no additional cost to the City.

E. Certificates: The Final Acceptance by the Commissioner will be contingent upon the Contractor delivering to the Commissioner all necessary certificates evidencing compliance in every respect with the requirements of the regulatory agencies having jurisdiction.

F. Results: If the results of tests and Special Inspections indicate that the material or procedures do not meet requirements as set forth on the Contract Drawings or in the Specifications or are otherwise unsatisfactory, the Contractor must only proceed as directed by the Commissioner. Additional costs resulting from retesting, re-inspecting, replacing of material and/or damage to the Work and any delay caused to the schedule will be borne by the Contractor.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, the Contractor must repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

END OF SECTION 01 40 00

(No Text on This Page)

SECTION 01 42 00
REFERENCES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 DEFINITIONS:

REFER TO THE ADDENDUM, Article IX, FOR ADDITIONAL DEFINITIONS AND REVISIONS TO THE CONTRACT AND SPECIFICATIONS

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. "APPROVED," ETC. - "Approved," "acceptable," "satisfactory," and words of similar import will mean and intend approved, acceptable, or satisfactory to the Commissioner.

C. Design Consultant: “Design Consultant” means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

D. "DIRECTED," "REQUIRED," ETC.- Wherever reference is made in the Contract to the Work or its performance, the terms "directed," "required," "permitted," "ordered," "designated," "prescribed," "determined," and words of similar import will, unless expressed otherwise, imply the direction, requirements, permission, order, designation or prescription of the Commissioner.

E. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings.

1.3 CODES, AGENCIES AND REGULATIONS:

A.B.A	Architectural Barriers Act
A.D.A.A.G.	Americans with Disabilities Act (ADA) Accessibility Guidelines
B.G. & E.	Bureau of Gas and Electricity of the City of New York
B.S. A.	New York City Board of Standards and Appeals
DOE	Department of Energy
E.C.C.C.N.Y.S.	Energy Conservation Construction Code of New York State
EPA	Environmental Protection Administration
N.Y.C.C.C.	New York City Construction Codes
N.Y.C.P.C.	New York City Plumbing Code
N.Y.C.B.C.	New York City Building Code
N.Y.C.M.C.	New York City Mechanical Code New York
N.Y.C.F.G.C.	New York City Fuel Gas Code
N.Y.S. D.O.L	New York State Department of Labor
N.Y.C.D.O.B.	New York City Department of Buildings
N.Y.C.D.E.P.	New York City Department of Environmental Protection
N.Y.C.D.O.T.	New York City Department of Transportation
N.Y.C.E.C.	New York City Electrical Code
N.Y.C.E.C.C	New York City Energy Conservation Code
N.Y.C.F.C.	New York City Fire Code
N.Y.S...D.E.C.	New York State Department of Environmental Conservation
O.S.H.A.	Occupational Safety & Health Administration

1.4 INDUSTRY STANDARDS:

A. STANDARD REFERENCES – Unless otherwise specifically indicated in the Contract Documents, whenever reference is made to the furnishing of materials or testing thereof that conforms to the standards of any technical society, organization or body, it must be construed to mean the latest standard, code, specification adopted and published by that technical society, organization or body, as of the date of the bid opening, unless the provisions of the N.Y.C.C.C. adopts a different or earlier dated version of such standard. All references to the ICC A117.1 are only to the 2009 version, whether or not a specific version is specified.

B. APPLICABILITY OF STANDARDS: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect, to the extent referenced, as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference.

C. CONFLICTING REQUIREMENTS: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantity or quality, comply with the most stringent requirements. Immediately refer uncertainties and requirements that are different but apparently equal, to the Commissioner in writing for a decision before proceeding.

D. STANDARD SPECIFICATIONS - When no reference is made to a code, standard, or specification, the Standard Specifications of the ASTM or the AIEE, as the case may be, shall govern.

E. REFERENCES - Reference to a technical society, organization, or body may be made in the Specifications by abbreviations. Abbreviations and acronyms used in the Specifications and other Contract Documents mean the associated name. The following names are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the Issue Date of the Contract Documents.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AAPFCO	Association of American Plant Food Control Officials
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACAC	American Council for Accredited Certification
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AGMA	American Gear Manufacturer Association
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers

AI	Asphalt Institute
AIA	American Institute of Architects (The)
AIEE	American Institute of Electrical Engineers
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
ALI	Automotive Lift Institute
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	APA - The Engineered Wood Association
APA	Architectural Precast Association
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE/SEI	American Society of Civil Engineers, Structural Engineering Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering

ASTM	ASTM International (Formerly: American Society for Testing and Materials)
AWCI	Association of the Wall and Ceiling Industry
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWSC	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	Building Industry Consulting Services International
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CDPH	California Department of Public Health
CIBSE	Charted Institute of Building Services Engineers
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Consumer Electronics Association
CESB	Council of Engineering and Scientific Specialty Boards
CFFA	Chemical Fabrics & Film Association, Inc.
CFSEI	Cold-Formed Steel Engineers Institute
CGA	Compressed Gas Association
CGSB	Canadian General Standards Board
CIMA	Cellulose Insulation Manufacturers Association

CIPRA	Cast Iron Pipe Research Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CPSC	Consumer Product Safety Commission
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSA	Certified Steel Stud Association
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DASMA	Door and Access Systems Manufacturer's Association International
DHI	Door and Hardware Institute
DOC	U.S. Department of Commerce – National Institute of Standards and Technology
EIA	Electronic Industries Alliance
DOJ	U.S. department of Justice
EIMA	EIFS Industry Members Association
DOL	U.S. Department of labor

EJCDC	Engineers Joint Contract Documents Committee
DOTn	U.S. Department of Transportation
EN	European Committee of Standards
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
EVO	Efficiency Valuation Organization
FEMA	Federal Emergency Management Agency
FIBA	Federation Internationale de Basketball Amateur (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FMG	FM Global (Formerly: FM - Factory Mutual System)
FMRC	Factory Mutual Research (Now FMG)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association

HPW	H. P. White Laboratory, Inc.
HUD	U.S. Department of Housing and Urban Development
IAPMO	International Association of Plumbing and Mechanical Officials
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICC	International Code Council, Inc.
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
IICRC	Institute of Inspection, Cleaning, and Restoration
ILIA	Indiana Limestone Institute of America, Inc.
IPEMA	International Play Equipment Manufacturers Association
ISA	International Society of Arboriculture
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek
ITU	International Telecommunication Union

KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MIL	Military Specification Standards of the US Dept of Defense
MPEG	Moving Picture Experts Group
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBA	National Basketball Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association

NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NICET	National Institute for Certification in Engineering Technologies
NLGA	National Lumber Grades Authority
NIS	National Institute of Standards and Technology
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRDCA	National Roof Deck Association
NRMCA	National Ready Mixed Concrete Association
NSI	Natural Stone Institute
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)

NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Acquired by ITS - Intertek)
PCI	Precast / Pre-stressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PPS	Power Piping Society
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RMI	Rack Manufacturers Institute
RTI	(Formerly: NTRMA - National Tile Roofing Manufacturers Association) (Now TRI)
RUS	Rural Utilities Service, Department of Agriculture
SAE	SAE International
SCAQMD	South Coast Air Quality Management District
SCS	Scientific Certification System
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SGCC	Safety Glazing Certification Council
SHBI	Steel Heating Boiler Institute

SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SFIA	Steel Framing Industry Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSMA	the Steel Stud Manufacturers Association
SSPC	SSPC: The Society for Protective Coatings
SSSA	Soil Science Society of America
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TABB	Testing, Adjusting, and Balancing Bureau
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.

TPI	Turfgrass Producers International
TRI	Tile Roofing Institute (Formerly: RTI - Roof Tile Institute)
UL	Underwriters Laboratories Inc.
ULC	Underwriters Laboratories of Canada
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USC	United States Code
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WNBA	Women's National Basketball Association
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WRI	Wire Reinforcement Institute, Inc.
USEPA	United States Environmental Protection Agency
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00
TEMPORARY FACILITIES, SERVICES AND CONTROLS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:
1. Temporary Water System
2. Temporary Sanitary Facilities
3. Temporary Electric Power, Temporary Lighting System, and Site Security Lighting
4. Temporary Heat
5. Dewatering Facilities and Drains
6. Temporary Field Office for Contractor
7. DDC Field Office
8. Material Sheds
9. Temporary Enclosures
10. Temporary Partitions
11. Temporary Fire Protection
12. Work Fence Enclosure
13. Rodent and Insect Control
14. Plant Pest Control Requirements
15. Project Identification Signage
16. Project Construction Sign and Rendering
17. Security Guards/Fire Guards on Site
18. Safety

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY

B. Section 01 42 00 REFERENCES

C. Section 01 54 11 TEMPORARY ELEVATORS AND HOISTS

D. Section 01 54 23 TEMPORARY SCAFFOLDS AND SWING STAGING

E. Section 01 77 00 CLOSE OUT PROCEDURES

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Permanent Enclosure	As determined by the Commissioner, permanent or temporary roofing that is complete, insulated, and weather tight; exterior walls which are insulated and weather tight; and all openings that are closed with permanent construction or substantial temporary closures.

1.5 SUBMITTALS:

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Reports: Submit reports of tests, inspections, meter readings and similar procedures for temporary use.

1.6 PROJECT CONDITIONS:

A. Temporary Use of Permanent Facilities and Services: The Contractor will be responsible for the operation, maintenance, and protection of each permanent facility and service during its use as a construction facility before Final Acceptance by the City, regardless of previously assigned responsibilities.

B. The Contractor must install, operate, maintain and protect temporary facilities, services, and controls, including without limitation:

1. Keep temporary services and facilities clean and neat in appearance;
2. Operate temporary services in a safe and efficient manner;
3. Relocate temporary services and facilities as needed as Work progresses;
4. Do not overload temporary services and facilities or permit them to interfere with progress;
5. Provide necessary fire prevention measures; and
6. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on-Site.

1.7 NON-REGULAR WORK HOURS (OVERTIME):

A. The Contractor must provide the temporary services, facilities and controls set forth in this section during non-regular working hours if the Contract Drawings and/or the Specifications indicate that the Work, or specific components thereof, must be performed during non-regular working hours. In such case, all costs for the provision of temporary services, facilities and controls during non-regular working hours will be deemed included in the total Contract price.

B. The Contractor must provide the temporary services, facilities and controls set forth in this section during non-regular working hours if a change order is issued directing the Contractor to perform the Work, or specific components thereof, during non-regular working hours. In such case, compensation for the provision of temporary services, facilities and controls during non-regular working hours will be provided

through the change order.

1.8 SERVICES BEYOND COMPLETION DATE:

A. The Contractor must provide the temporary services, facilities and controls set forth in this section until the date on which it completes all required Work at the Site, including all Final Approved Punch List Work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. The Contractor must provide such temporary services, facilities and controls even if completion of all required Work at the Site occurs after the time fixed for such completion in Schedule A.

PART II – PRODUCTS

2.1 MATERIALS:

A. The Contractor must provide undamaged materials in serviceable condition and suitable for use intended.

B. Tarpaulins: Waterproof, fire-resistant UL labeled with flame spread rating of fifteen (15) or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

C. Water: Potable and in compliance with requirements of the New York City Department of Environmental Protection (DEP).

2.2 EQUIPMENT:

A. The Contractor must provide undamaged equipment in serviceable condition and suitable for use intended.

B. Water Hoses: Heavy-duty abrasive-resistant flexible rubber hoses, one hundred (100) feet (thirty (30) m) long with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

C. Electric Power Cords: Grounded extension cords.

1. Provide hard-service cords where exposed to abrasion or traffic.

2. Provide waterproof connectors to connect separate lengths of electric cords where single lengths do not reach areas of construction Activity.

3. Do not exceed safe length-voltage ratio.

D. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART III –EXECUTION:

3.1 INSTALLATION, GENERAL:

A. The Contractor must locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. The Contractor must provide each facility ready for use when needed to avoid delay. The Contractor must not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities as approved by the Resident Engineer.

3.2 TEMPORARY WATER SYSTEM:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2 A

A. TEMPORARY WATER SYSTEM - NEW FACILITIES: During construction, the Contractor must furnish a Temporary Water System as set forth below.

1. Immediately after the Commissioner has issued an order to start the Work, the Contractor must file an application with DEP for the schedule of charges for water use during construction. The Contractor will be responsible for payment of water charges.

2. Immediately after the Commissioner has issued an order to start the Work, the Contractor must file an application with DEP's Bureau of Water Supply and obtain a permit to install the temporary water supply system. The system must be installed and maintained for the use of the Contractor and its subcontractors. A copy of the above-mentioned permit must be filed with the Commissioner. The Contractor must provide temporary water main, risers and waste stacks as directed and install on each floor, outlets with two (2) 3/4" hose valve connections over a barrel installed on a steel pan. The Contractor must provide drains from the pans to the stack and house sewer and hose bibs to drain the water supply risers and mains. During winter months, the Contractor must take the necessary precautions to prevent the temporary water system from freezing. The Contractor must provide repairs to the temporary water supply system for the duration of the Project until said temporary system is dismantled and removed.

3. Disposition of Temporary Water System: The Contractor will be responsible for dismantling the temporary water system when no longer required for the construction operations, or when replaced by the permanent water system installed for the Project, or as otherwise directed by the Resident Engineer. All repair work resulting from the dismantling of the temporary water system will be the responsibility of the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2 B

B. TEMPORARY WATER SYSTEM – PROJECTS IN EXISTING FACILITIES:

1. When approved by the Commissioner, use of existing water system will be permitted for temporary water service during construction, as long as the system is cleaned and maintained in a condition acceptable to the Commissioner. At Substantial Completion, the Contractor must restore the existing water system to conditions existing before initial use.

2. The Contractor will be responsible for all repairs to the existing water system permitted to be used for temporary water service during construction. The Contractor will be responsible to maintain the existing system in a clean condition on a daily basis, acceptable to the Commissioner.

3. The Contractor will be responsible for payment of water charges as directed by the Commissioner. Billing will be in accordance with the New York City Water Board Water and Wastewater Rate Schedule.

C. WASH FACILITIES: The Contractor must install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition, including without limitation:

1. Dispose of drainage properly;

2. Supply cleaning compounds appropriate for each condition; and

3. Include safety showers, eyewash fountains and similar facilities for the convenience, safety and sanitation of personnel.

D. DRINKING WATER FACILITIES: The Contractor must provide drinking water fountains or containerized tap-dispenser bottled-drinking water units, complete with paper cup supplies. Where power is available, provide

electric water coolers to maintain dispensed water temperature at forty-five (45) to fifty-five (55) deg. F (7 to 13 deg. C).

3.3 TEMPORARY SANITARY FACILITIES:

A. The Contractor must provide toilets, wash facilities, and drinking water fixtures in compliance with regulations and health codes for type, number, location, operation and maintenance of fixtures and facilities. Provide toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility, and provide covered waste containers for used materials.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3 B

B. SELF-CONTAINED TOILET UNITS:

1. The Contractor must provide temporary single-occupant toilet units of the chemical, aerated re-circulation, or combustion type for use by all construction personnel. Units must be properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Quantity of toilet units must comply with the latest Occupational Safety and Health Administration (OSHA) regulations.

2. Toilets: The Contractor must install separate, self-contained toilet units for male and female personnel. Shield toilets to ensure privacy.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3 C

C. EXISTING TOILETS:

1. TOILET FACILITIES: When approved by the Commissioner, the Contractor must arrange for the use of existing toilet facilities by all personnel during the execution of the Work. The Contractor will be responsible to clean and maintain facilities in a condition acceptable to the Resident Engineer and, at Substantial Completion , to restore facilities to the condition at the time of initial use.

2. MAINTENANCE - The Contractor must maintain the temporary toilet facilities in a clean and sanitary manner and make all necessary repairs.

3. NUISANCES - The Contractor must not cause any sanitary nuisance to be committed by its employees or the employees of its subcontractors in or about the Work and must enforce all sanitary regulations of the City and State Health Authorities.

3.4 TEMPORARY ELECTRIC POWER, TEMPORARY LIGHTING SYSTEM, AND SITE SECURITY LIGHTING:

A. SCOPE: This section sets forth the General Conditions and procedures relating to Temporary Electric Power, Temporary Lighting System, and Site Security Lighting during the construction period.

B. TEMPORARY ELECTRIC POWER: The Contractor must provide and maintain a temporary electric power service and distribution system of sufficient size, capacity and power characteristics required for construction operations for all required Work by the Contractor and its subcontractors, including but not limited to, power for the temporary lighting system, site security lighting, construction equipment, hoists, temporary elevators and all field offices. temporary electric power must be provided as follows:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (1)

1. CONNECTION TO UTILITY LINES:

a. Temporary electric power service for use during construction must be provided as follows: The Contractor must make all necessary arrangements with the public utility company and pay all charges for the Temporary Electric Power system. The Contractor must include in its total Contract price any charges for temporary electric power, including charges that may be made

by the public utility company for extending its electrical facilities, and for making final connections. The Contractor will make payment directly to the public utility company.

b. APPLICATIONS FOR METER: The Contractor must complete an application to the public utility company and sign all documents necessary for, and pay all charges incidental to, the installation of a watt hour meter or meters for Temporary Electric Power. The Contractor must pay to the public utility company all bills for temporary electric energy used throughout the Work as they become due.

c. SERVICE AND METERING EQUIPMENT: The Contractor must furnish and install, at a suitable location on the Site, approved service and metering equipment for the Temporary Electric Power System, ready for the installation of the public utility company's metering devices. The temporary service mains to and from the metering location must not be less than one hundred (100) Amperes, 3-phase, 4-wire and must be of sufficient capacity to take care of all demands for all construction operations and must meet all requirements of the New York City Electrical Code.

d. PAYMENT: See Sub-Section 3.4.F regarding payment for this scope of work.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (2)

2. CONNECTION TO EXISTING ELECTRICAL POWER SERVICE:

a. When approved by the Commissioner, electrical power service for the temporary lighting system and for the operation of small tools and equipment less than ¼ horsepower may be taken from the existing electric distribution system if the existing system is of adequate capacity for the temporary power load. The Contractor must cooperate and coordinate with the facility custodian, so as not to interfere with the normal operation of the facility.

b. There will be no charge to the Contractor for the electrical energy consumed.

c. The Contractor must provide, maintain and pay all costs for separate temporary electric power for any temporary power for equipment larger than 1/4 horsepower. When directed by the Commissioner, the Contractor must remove its own temporary power system.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (3)

3. ELECTRICAL GENERATOR POWER SERVICE:

a. When connection to utility lines or existing facility electric service is not available or is not adequate to supply the electric power need for construction operations, the Contractor must provide self-contained generators to provide power beyond that available.

b. Pay for all energy consumed in the progress of the Work, exclusive of that available from the existing facility or utility company.

c. Provide for control of noise from the generators.

d. Comply with the Ultra Low Sulfur Fuel in Non-Road Vehicles requirements as set forth in Article 5.4 of the Contract.

e. PAYMENT: See Sub-Section 3.4.F regarding payment for this scope of work.

C. USE OF COMPLETED PORTIONS OF THE ELECTRICAL WORK:

1. USE OF MAIN DISTRIBUTION PANEL: As soon as the permanent electric service feeders and equipment metering equipment and main distribution panel are installed and ready for operation, the Contractor must have the temporary lighting and power system changed over from the temporary service points to the main distribution panel.

2. COST OF CHANGE OVER: The Contractor will be responsible for all costs due to this change over of service and it must also make application to the public utility company for a watt hour meter to be set on the permanent meter equipment.

3. The requirements for temporary electric power service specified herein must be adhered to after change over of service until Final Acceptance of the Project.

4. NO EXTRA COST: The operation of the service and switchboard equipment will be under the supervision of the Contractor, but this will in no way be interpreted to mean the acceptance of such part of the installation or relieve the Contractor from its responsibility for the complete Work or any part thereof. There will be no additional charge for supervision by the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 D

D. TEMPORARY LIGHTING SYSTEM:

1. The Contractor must provide adequate service for the temporary lighting system, or a minimum of one hundred (100) Amperes, 3-phase, 4-wire service for the temporary lighting system, whichever is greater, and make all necessary arrangements with the public utility company and pay all charges by them for the Temporary Lighting System.

2. The Contractor must furnish and connect to the metered service point a Temporary Lighting System to illuminate the entire area where Work is being performed and points adjacent to the Work, with separately fused circuits for stairways and bridges. Control switches for stairway circuits must be located near entrance on ground floor.

3. ITEMS: The Temporary Lighting System provided by the Contractor must consist of wiring, fixtures, left-hand double sockets (one (1) double socket for every 400 square feet, with one (1) lamp and one (1) three-prong outlet), lamps, fuses, locked-type guards, pigtails and any other incidental material. Additional details may be outlined in the detailed Specifications for the electrical Work. Changes may be made, provided the full equivalent of those requirements is maintained.

4. The Temporary Lighting System will be progressively installed as required for the advancement of the Work under the Contract.

5. RELOCATION: The cost for the relocation or extension of the original Temporary Lighting System, as required by the Contractor or its subcontractors, that is not required due to the normal advancement of the Work, as determined by the Resident Engineer, will be borne by the Contractor.

6. PIGTAILS: The Contractor must furnish pigtails with left-hand sockets with locked-type guards and forty (40) feet of rubber covered cable. The Contractor must furnish and distribute a minimum of three (3) complete pigtails to each subcontractor. See the detailed Electrical Specifications for possible additional pigtails required.

7. LAMPS: The Contractor must furnish and install one (1) complete set of lamps, including those for the trailers. Broken and burned out lamps in the temporary lighting system, DDC field office, and construction trailers must be replaced by the Contractor. All lamps must be compact fluorescent.

8. CIRCUIT PROTECTION: The Contractor must furnish and install Ground Fault Interruption (GFI) protection for the temporary lighting and site security lighting systems.

9. MAINTENANCE OF TEMPORARY LIGHTING SYSTEM:

   a. The Contractor must maintain the Temporary Lighting System in good working order during the scheduled hours established.

   b. The Contractor must include in its total Contract price all costs in connection with the Temporary Lighting System, including all costs for installation, maintenance and electric power.

10. REMOVAL OF TEMPORARY LIGHTING SYSTEM: The temporary lighting system must be removed by the Contractor when authorized by the Commissioner.

11. HAND TOOLS: The temporary lighting system must not be used for power purposes, except that light hand tools not larger than 1/4 horsepower may be operated from such system by the Contractor and its subcontractors.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 E

E. SITE SECURITY LIGHTING (NEW CONSTRUCTION ONLY):

1. The Contractor must furnish, install and maintain a system of site security lighting, as herein specified, to illuminate the construction Site of the Project, with the system connected to and energized from the Temporary Lighting System. All costs in connection with site security lighting will be deemed included in the total Contract price.

2. It is essential that the site security lighting system be completely installed and operating at the earliest possible date. The Contractor must direct its subcontractors to cooperate, coordinate and exert every effort to accomplish an early complete installation of the site security lighting system. If, after the system is installed and in operation, a part of the system interferes with the Work of any trade, the Contractor will be completely responsible for the expense of removing, relocating, and replacing all equipment necessary to reinstate the system to proper operating conditions.

3. The system must consist of flood lighting by pole-mounted guarded sealed-beam units. Floodlight units must be mounted sixteen (16) feet above grade. Floodlights must be spaced around the perimeter of the Site to produce an illumination level of no less than one (1) foot candle around the perimeter of the Site, as well as in any potentially hazardous area or any other area within the Site that might be deemed by the Resident Engineer to require security illumination. The system must be installed in a manner acceptable to the Resident Engineer. The first lighting unit in each circuit must be provided with a photoelectric cell for automatic control. The photoelectric cell must be installed as per manufacturer's recommendations.

4. All necessary poles must be furnished and installed by the Contractor.

5. The site security lighting must be kept illuminated at all times during the hours of darkness. The Contractor must, at its own expense, keep the system in operation and must furnish and install all material necessary to replace all damaged or burned out parts.

6. The Contractor must be on telephone call alert for maintaining the system during the operating period stated above.

7. All materials and equipment furnished under this section will remain the property of the Contractor and must be removed and disposed of by the Contractor when authorized in writing by the Resident Engineer.

F. PAYMENT FOR TEMPORARY ELECTRICAL

1. The following temporary electrical scope will be paid for on unit price basis:

   a. Temporary electric power where the Contractor pays for the utility costs (subsection 3.4.B.1)

   b. Temporary electric power where the Contractor provides generator service (subsection 3.4.B.3)

2. All temporary electrical scope described in Subsection 3.4 except as noted above in 3.4.F.1 must be included in the Contractor’s lump sum price.

3. For the temporary electric power that will be paid for by unit price:

   a. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for temporary electric power in accordance with these General Conditions.

b. The unit price bid per month for temporary electric power must include the cost of furnishing all labor, materials, plant, equipment, insurance, and incidentals required to provide temporary electric power, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.5

3.5 TEMPORARY HEAT:

A. GENERAL:

1. Definition: The provision of Temporary Heat means the provision of heat in order to permit construction to be performed in accordance with the Progress Schedule during all seasons of the year and to protect the Work from the harmful effects of low temperature. In the event the building, or any portion thereof, is occupied during construction, the provision of Temporary Heat will include the provision of heat to permit normal operations in such occupied areas.

   a. The provision of Temporary Heat must be in accordance with the temperature requirements set forth in sub-section 3.5 C herein.

   b. The provision of Temporary Heat must include the provision of: 1) all fuel necessary and required, 2) all equipment necessary and required, and 3) all operating labor necessary and required. Operating labor must mean that minimum force required for the safe day-to-day operation of the system for the provision of Temporary Heat and must include, without limitation, heating maintenance labor and/or fire watch as required by New York City Fire Department (FDNY) regulations. Operating labor may be required seven (7) days per week and during non-regular working hours, for the period of time required by seasonal weather conditions.

   c. In the event the building, or any portion thereof, is occupied and the Project involves the replacement, modification, and/or shut down of the permanent heating system, or any key component thereof, and such system is a combined system which furnishes domestic hot water for the building occupants, the provision of Temporary Heat must include the provision of domestic hot water at the same temperature as the system which is being replaced. Domestic hot water must be provided in accordance with the phasing requirements set forth in the Contract Documents.

2. Responsibility: The Contractor's responsibility for the provision of Temporary Heat, including all expenses in connection therewith, is as set forth below:

   a. Projects involving enclosure of the building:

      1) Prior to Enclosure: Until the Commissioner determines that the building has been enclosed, as set forth in sub-section 3.5 B, the Contractor is responsible for the provision of Temporary Heat.

      2) Post Enclosure: Once the Commissioner determines that the building, or any portion thereof, has been enclosed, as set forth in sub-section 3.5 B, the Contractor is responsible for the provision of Temporary Heat by one or more of the following means: 1) by an existing heating system (if any), 2) by a permanent heating system which is being installed as part of the Project, or 3) by a temporary heating system(s).

      3) The Contractor must, within two (2) weeks of the kick-off meeting, submit to DDC for review its proposed plan to provide Temporary Heat. Such plan is subject to approval by the Resident Engineer. The Contractor must provide Temporary Heat in accordance with the approved plan until written acceptance by the Commissioner of the Work of all subcontractors, including punch list Work, unless directed otherwise in writing by the

Commissioner. The responsibility of the Contractor provided for herein is subject to the exception set forth in sub-section 3.5 A.2 (b) herein.

b. Projects not involving enclosure of the building:

1) If the Project involves the installation of a new permanent heating system if one did not exist previously, or the replacement, modification, and/or shut down of the existing permanent heating system, or any key component thereof, the Contractor will be responsible for the provision of Temporary Heat, except as otherwise provided in sub-section 3.5 H.3(b).2 herein.

2) If the Project does not involve the installation of a new permanent heating system if one did not exist previously, or the replacement, modification, and/or shut down of the existing permanent heating system, or any key component thereof, there is no Contractor responsibility of the provision of Temporary Heat, unless otherwise specified in the Contract Documents. However, if the Commissioner, pursuant to sub-section 3.5 H.3 (b).1 herein, determines that the provision of Temporary Heat is necessary due to special and/or unforeseen circumstances, the Contractor will be responsible for the provision of Temporary Heat and must be paid for the same in accordance with sub-section 3.5 H.3 (b).1 herein.

B. ENCLOSURE OF STRUCTURES:

1. Notification: The Contractor must notify all its subcontractors and the Resident Engineer at least thirty (30) Days prior to the anticipated date that the building(s) will be enclosed.

2. Commissioner Determination: The Commissioner will determine whether the building, or any portion thereof, has been enclosed. As indicated in sub-section 3.5 A.2 above, once the building has been enclosed, the Contractor will be responsible for the provision of Temporary Heat. The Commissioner's determination with respect to building enclosure will be based upon all relevant facts and circumstances, including without limitation, 1) whether the building meets the criteria set forth in Paragraph 3 below, and 2) whether the openings in the building, such as doorways and windows, have been sufficiently covered so as to provide reasonable heat retention and protection from the elements.

3. Criteria for enclosure:

a. Roof Area:

1) A building will be considered to be roofed when the area to be roofed is covered by a permanent structure and all openings through the permanent structure are covered and protected by temporary covers as described in Paragraph (c) below.

2) Intermediate floor structures of multi-floor buildings will be considered to be roofed subject to the same requirements of the building roof.

3) The final roofing system need not be in place for the building or structure to be determined to be enclosed, provided, however, all openings through the permanent structure covering the roof must be covered and protected by temporary covers, as described in Paragraph (c) below.

b. Walls: For the walls to be determined to be enclosed, permanent exterior wall elements or facing material must be in place and all openings must be covered and protected by temporary covers, as described in Paragraph (c) below.

c. Temporary Covers: In order to be acceptable, temporary covers must be securely fixed to prevent the entrance of rain, snow and direct wind. The minimum material requirements for temporary covers are as follows: 1) minimum ten (10) millimeter plastic, 2) minimum twelve

(12) ounce waterproof canvas tarpaulins, or 3) a minimum three-eighths (3/8) inch thickness exterior grade plywood.

d. Temporary covers for openings will be the responsibility of the Contractor and such Work will be deemed included in the Contract price.

C. TEMPERATURE REQUIREMENTS:

1. Unoccupied Buildings: The temperature requirement for the provision of Temporary Heat in unoccupied buildings will be the GREATER of the following: 1) fifty (50) degrees Fahrenheit, or 2) the temperature requirement for the particular type of Work set forth in the Contract Documents.

2. Occupied Buildings: The temperature requirement for the provision of Temporary Heat in occupied buildings, or portions thereof, will be the GREATER of the following: 1) sixty-eight (68) degrees Fahrenheit, or 2) the temperature requirement for the particular type of Work set forth in the Contract Documents.

D. DURATION:

1. The Contractor is required to provide Temporary Heat until Final Acceptance, including all punch list work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. The Contractor is responsible for the provision of Temporary Heat for the time specified herein, regardless of any delays in completion of the Project, including delays that result in the commencement of the provision of Temporary Heat during a season that is later than that which may have been originally anticipated. Payment for temporary heat will be made on a unit price basis in accordance with Sub-Section 3.5.K.

E. METHOD OF TEMPORARY HEAT:

1. The method of temporary heat must be in conformance with the New York City Fire Code and with all applicable laws, rules, and regulations. Prior to implementation, such method must be subject to the written approval of the Commissioner.

2. The method of temporary heat must:

a. Not cause the deposition of dirt or smudges upon any finished Work or cause any defacement or discoloration to the finished Work.

b. Not be injurious or harmful to people or materials.

c. Portable fueled heating devises or equipment will NOT be allowed for use as temporary heat other than construction-related curing or drying in conformance with the NYC Fire Code.

3. No open fires will be permitted.

F. TEMPORARY HEATING SYSTEM:

1. The temporary system for the provision of Temporary Heat provided by the Contractor following enclosure of the building must be complete, including, subject to provisions of paragraph E above, boilers pumps, radiators, space heaters, water and heating piping, insulation and controls. The temporary system for the provision of Temporary Heat must be capable of maintaining the minimum temperature requirements set forth in Paragraph C above.

G. COORDINATION:

1. The Contractor, in the provision of Temporary Heat, must coordinate its operations in order to insure sufficient and timely performance of all required Work, including Work performed by trade subcontractors. The Contractor must supply and pay for all water required and used in the building for the operation of the heating system(s) for the purpose of Temporary Heat. The Contractor must include all expenses in connection with the supply of water for Temporary Heat in its total Contract price. During the period in which Temporary Heat in an enclosed building is being furnished and

maintained, the Contractor must provide proper ventilating and drying, open and close the windows and other openings when necessary for the proper execution of the Work and when directed by DDC. The Contractor must maintain all permanent or temporary enclosures at its own expense.

H. USE OF PERMANENT HEATING SYSTEMS:

1. Use of Permanent Heating System for Temporary Heat after Building Enclosure:

   a. The Contractor must provide all labor and materials to promptly furnish and set all required equipment, convectors and/or radiators, piping, valves, fitting, etc., in ample time for their use for the provision of Temporary Heat after enclosure of the building.

   b. New portions of the permanent heating system that are used for furnishing Temporary Heat must be left in near-perfect condition when delivered to the City for operation. Any repairs required, other than for ordinary wear and tear on the equipment, must be made by the Contractor at his/her expense. The starting date for the warranty or guarantee period for such equipment must be the date of Substantial Completion acceptance.

   c. In the event that the Contractor does not advance the installation of the permanent heating system in sufficient time to permit its use for Temporary Heat as determined by DDC, the Contractor must furnish and install a separate system for the provision of Temporary Heat as required to maintain the minimum temperature requirements set forth in Paragraph C above.

2. All equipment for the system for the provision of Temporary Heat must be placed so as to comply with the requirements specified hereinbefore, and must be connected, disconnected and suitably supported and located so as to permit construction Work, including finish Work such as wall plastering and painting, to proceed. The installation of the system for the provision of Temporary Heat by the Contractor, including the placing of ancillary system equipment, must be coordinated with the operations of all trade subcontractors so as to insure sufficient and timely performance of the Work. Once the permanent heating system is operating properly, the Contractor must remove all portions of the system for Temporary Heat not part of the permanent heating system.

3. Temporary Heat Allowance for Special Conditions or and/or Unforeseen Circumstances:

   a. The City may establish an Allowance in the Contract for payment of costs and expenses in connection with the provision of Temporary Heat as set forth herein. If established, the City will include an amount for such Allowance on the Bid Form, and the Contractor must include such Allowance amount in its total Contract price. The Contractor will only be entitled to payment from this Allowance under the conditions and in accordance with the requirements set forth below. In the event this Allowance or any portion thereof remains unexpended at the conclusion of the Contract, such Allowance must remain the sole property of the City. Should the amount of the Allowance be insufficient to provide payment for the expenses specified below, the City will increase the amount of the Allowance.

   b. The Allowance set forth herein may be utilized only under the conditions set forth below.

      1. In the event the Project does not involve the installation of a new permanent heating system if one did not exist previously, or the replacement, modification, and/or shut down of the existing permanent heating system, or any key component thereof, and the Commissioner determines that the provision of Temporary Heat is necessary due to special and/or unforeseen circumstances, the Contractor must be responsible for the provision of Temporary Heat, as directed by the Commissioner. The City must pay such Contractor for all costs for labor, material, and equipment necessary and required for the same. Payment must be made in accordance with Article 26 of the Contract, except that the cost of fuel must be as set forth in Paragraph (c) below.

      2. In the event the Commissioner determines that there is a need for maintenance of the permanent heating system by the Contractor after Final Acceptance by the

Commissioner of the Work, and that the need for such maintenance is not the fault of the Contractor, the Contractor must provide the required maintenance of the permanent heating system for the period of time directed by the Commissioner. The City will pay the Contractor for the cost of direct labor and fuel necessary and required in connection with such maintenance, excluding the cost of any foremen or other supervision. Payment must be made in accordance with Article 26 of the Contract, except that the cost of fuel must be as set forth in Paragraph (c) below.

c. Payment for Fuel Costs: Payment from the Allowance set forth herein for the cost of fuel necessary and required to operate the system for the provision of Temporary Heat, or to maintain the permanent heating system under the conditions set forth in Paragraph b above, must be limited to the direct cost of such fuel. The Contractor will not be entitled to any overhead and/or profit for such fuel costs. In order to receive payment for such fuel costs, the Contractor must present original invoices for the same. DDC reserves the right to furnish the required fuel.

I. RELATED ELECTRICAL WORK:

1. The Contractor must be responsible for providing the items set forth below and must include all expenses in connection with such items in its total Contract price. The Contractor must provide such items promptly when required and must in all respects coordinate its Work with the Work performed by trade subcontractors in order to facilitate the provision of Temporary Heat.

   a. The Contractor must provide all labor, materials, equipment and power necessary and required to furnish and maintain any temporary or permanent electrical connections to all equipment specified to be connected as part of the work of the Contractor's Contract.

   b. The Contractor must supply and pay for all power necessary and required for the operation of the system for the provision of Temporary Heat and/or the permanent heating system used for Temporary Heat. Such power must be provided by the Contractor for the duration the Contractor is required to provide Temporary Heat, as set forth in sub-section 3.5 D herein.

2. In providing the items set forth in Paragraph 1 above, the Contractor is advised that labor may be required seven (7) days a week and/or during non-regular working hours for the period of time required by seasonal weather conditions.

J. RELATED PLUMBING WORK:

1. The Contractor must be responsible for providing all labor, materials, and equipment necessary and required to furnish and maintain all temporary or permanent connections to all equipment or plumbing outlets specified to be provided as part of the Work of this Contract. The Contractor must include all expenses in connection with such items of Work in its total Contract price. The Contractor must provide such items of Work promptly when required and must in all respects coordinate its Work with the Work performed by trade subcontractors in order to facilitate the provision of Temporary Heat.

2. In the event portions of the permanent plumbing equipment furnished by the Contractor as part of the Work of this Contract are used for the provision of Temporary Heat either during construction or prior to acceptance by the City of the complete plumbing system, the Contractor will be responsible to provide such plumbing equipment to the City in near-perfect condition and must make any repairs required, other than for ordinary wear and tear on the equipment, at the Contractor's expense. The starting date for warranty and/or guarantee period for such plumbing equipment must be the date of Substantial Completion by the City.

3. For Projects requiring the installation of new and/or modified gas service, as well as associated meter installations, the Contractor must promptly perform all required filings and coordination with the utility companies in order to expedite the installation, testing, and approval of the gas service and associated meter(s).

K. PAYMENT FOR TEMPORARY HEAT

1. Payment for temporary heat will be made on a unit price basis.
2. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for temporary heat in accordance with these specifications.
3. The unit price bid per month for temporary heat must include the cost of furnishing all labor, materials, plant, equipment, insurance, and incidentals required to provide temporary heat, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner. When directed in writing by the Commissioner, temporary heat will be provided and paid for a period of time beyond 6 months past the Substantial Completion date. Payment for each month's temporary heat after the date of Substantial Completion acceptance will be made as part of the final payment.

3.6 STORM WATER CONTROL, DEWATERING FACILITIES AND DRAINS:

A. PUMPING:

1. Comply with requirements of authorities having jurisdiction. Maintain Project Site, excavations, and construction free of water. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rainfall.
2. Contractor must furnish and install all necessary automatically operated pumps of adequate capacity with all required piping to run-off agencies, so as to maintain the excavation, cellar floor, pits and exterior depressions and excavations free from accumulated water during the entire period of construction and up to the date of Final Acceptance of Work of the Contract.
3. All pumps must be maintained at all times in proper working order.
4. Dispose of rainwater in a lawful manner that will not result in flooding the Project or adjoining properties nor endanger permanent Work or temporary facilities.
5. Remove snow and ice as required to minimize accumulations.

3.7 TEMPORARY FIELD OFFICE FOR CONTRACTOR:

A. The Contractor must establish a temporary field office for its own use at the Site during the period of construction, at which readily available copies of all Contract Documents must be kept.

B. The field office must be located where it will not interfere with the progress of any part of the Work or with visibility of traffic control devices.

C. CONTRACTOR'S REPRESENTATIVE: There must be a responsible and competent representative of the Contractor in charge of the office who is duly authorized to receive orders and directions and to put them into effect.

D. Arrangements must be made by the Contractor whereby its representative may be readily available by telephone.

E. All temporary structures must be of substantial construction and neat appearance, and must be painted a uniform gray unless otherwise directed by the Commissioner.

F. CONTRACTOR'S SIGN: The Contractor must post and keep posted on the outside of its field office, office, exterior fence, or wall at Site of Work, a legible sign giving the full name of the company, address of the company and telephone number(s) of responsible representative(s) of the firm who can be reached in the event of an emergency at any time.

G. ADVERTISING PRIVILEGES: The City reserves the right to all advertising privileges. The Contractor must not cause any signs of any kind to be displayed at the Site unless specifically required herein or authorized by the Commissioner.

3.8 DDC FIELD OFFICE:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 A

A. OFFICE SPACE IN EXISTING BUILDING:

1. The Resident Engineer will arrange for office space for sole use in the building where Work is in progress. The Contractor must provide and install a lockset for the door to secure the equipment in the room. The Contractor must provide two (2) keys to the Resident Engineer. After completion of the Project the Contractor must replace the original lockset on the door and ensure its proper operation.

2. In addition to equipment specified in sub-section 3.8 D, the Contractor must provide, for exclusive use of the DDC Field Office, the following:

   a. Two (2) single pedestal desks, 42” x 32”; two (2) swivel chairs with arms and three (3) side chairs without arms to match desk. Two metal (2) lockers, single units, 15” x 18” x 78” overall including 6” legs. Lockers to have flat key locks with two (2) keys each, General Steel products or approved equal. Two (2) full ball bearing suspension four (4) drawer vertical legal filing cabinets with locks, approximately 52”H x 28 ½”D x 18”W.

   b. One (1) 9000 B.T.U air conditioner or as directed by Commissioner. Wiring for the air conditioner must be minimum No. 12 AWG fed from individual circuits in the fuse box.

   c. One (1) folding conference table, 96” x 30” and ten (10) folding chairs.

   d. Two (2) metal wastebaskets.

   e. One (1) fire extinguisher, one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.

   f. One (1) Crystal Springs water cooler with bottled water, Model No. LP14058 or approved equal to be furnished for the duration of the Project as required.

3. The Contractor must provide one (1) telephone, where directed and must pay all costs for telephone service for calls within the New York City limits for the duration of the Project.

4. All furniture and equipment, except computer equipment specified in sub-section 3.8 D.3, must remain the property of the Contractor.

5. Computer workstation quantities must be provided as specified in sub-section 3.8 B 3-a for DDC Managed Projects, or sub-section 3.8 B 3-b for CM Managed Projects.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 B

B. DDC FIELD OFFICE TRAILER:

1. GENERAL: The Contractor must, for the time frame specified herein, provide and maintain at its own cost and expense a DDC Construction Field Office and all related items as specified herein [hereinafter collectively referred to as the “DDC Field Office”] for the exclusive use of the Resident Engineer. The DDC Field Office must be located at the Project Site and must be solely dedicated to the Project. Provision of the DDC Field Office must commence within thirty (30) Days from Notice to Proceed (NTP) and must continue through forty-five (45) Days after Substantial Completion of the required construction at the Project Site. The Contractor must remove the DDC Field Office forty-five (45) Days after Substantial Completion of the required construction, or as otherwise directed in

writing by the Commissioner.

2. TRAILER: The Contractor must provide at its own cost and expense a mobile office trailer for use as the DDC Field Office. The Contractor must install and connect all utility services to the trailer within thirty (30) Days from NTP. The trailer must have equipment in compliance with the minimum requirements hereinafter specified. Any permits and fees required for the installation and use of said trailer must be borne by the Contractor. The trailer including furniture and equipment therein, except computer equipment specified in sub-section 3.8D.3 herein, must remain the property of the Contractor.

3. Trailer must be an office-type trailer of the size specified herein, with exterior stairs at entrance. Trailer construction must be minimum 2 x 4 wall construction fully insulated with paneled interior walls, pre-finished gypsum board ceilings and vinyl tile floors.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8.B.3a or SUB-SECTION 3.8.B.3b.

a. DDC Managed Project Trailer: DDC Field Office Trailer Size, Layout and Computer Workstation:

   1) Overall length: 32 Feet
      Overall width: 10 Feet
   2) Interior Layout:
      Provide one (1) general office/conference room area and one (1) private office at one end of the trailer. Provide equipment and amenities as specified in sub-section 3.8.B herein.
   3) Computer Workstation: Provide one (1) complete computer workstation and one (1) tablet, as specified in sub-section 3.8.D herein, in the private office area as directed by the Resident Engineer.

b. CM Managed Project Trailer: DDC Field Office Trailer Size, Layout and Computer Workstation:

   1) Overall length: 50 Feet
      Overall width: 10 Feet
   2) Interior Layout:

      Provide one (1) large general office/conference room in the center of the trailer and two (2) private offices, one (1) each at either end of the trailer. Provide equipment and amenities as specified in sub-section 3.8.B herein.

   3) Computer Workstation:

      Provide three (3) complete computer workstations and two (2) tablets as specified in sub-section 3.8.D herein. Provide one (1) each complete computer workstation in each private office and one (1) complete computer workstation at the secretarial position as directed by the Resident Engineer.

4. The exterior of the trailer must be lettered with black block lettering of the following heights with white borders:

CITY OF NEW YORK	2-1/2"
DEPARTMENT OF DESIGN AND CONSTRUCTION	3-3/4"
DIVISION OF PUBLIC BUILDINGS	3-1/2"

DDC FIELD OFFICE 2-1/2"

NOTE: In lieu of painting letters on the trailer, the Contractor may substitute a sign constructed of a good quality weatherproof material with the same type and size of lettering above.

5. All windows and doors must have aluminum insect screens. Provide wire mesh protective guards at all windows.

6. The interior must be divided by partitions into general and private office areas as specified herein. Provide a washroom located adjacent to the private office and a built-in wardrobe closet opposite the washroom. Provide a built-in desk in the private office(s) with fixed overhead shelf and clearance below for two (2) file cabinets.

7. Provide a built-in drafting or reference table, located in the general office/conference room, at least sixty (60) inches long by thirty-six (36) inches wide with cabinet below and wall type plan rack at least forty-two (42) inches wide.

8. The washroom must be equipped with a flush toilet, wash basin with two (2) faucets, medicine cabinet, complete with supplies and a toilet roll tissue holder. Plumbing and fixtures must be approved house type, with each appliance trapped and vented and a single discharge connection. Five (5) gallon capacity automatic electric heater for domestic hot water must be furnished.

9. HVAC: The trailer must be equipped with central heating and cooling adequate to maintain a temperature of seventy-two (72) degrees during the heating season and seventy-five (75) degrees during the cooling season when the outside temperature is five (5) degrees F. winter and eighty-nine (89) degrees F. summer.

10. Interior lighting must be provided via ceiling mounted fluorescent lighting fixtures to a minimum level of fifty (50) foot candles in the open and private office(s) along with sufficient lighting in the washroom. Broken and burned out lamps must be replaced by the Contractor. A minimum of four (4) duplex convenience outlets must be provided in the open office and two (2) each in the private office(s). These outlets must be in addition to special outlet requirements for computer stations, copiers, HVAC unit, etc. Exterior lighting must be provided for the security of staff and visitors, with lighting provided at all entrances and as directed by the Commissioner.

11. Electrical service switch and panel must be adequately sized for the entire trailer load. Provide dedicated circuits for HVAC units, hot water heater, copiers and other equipment as required. All wiring and installation must conform to the New York City Electrical Code.

12. The following movable equipment must be furnished:

    a. Two (2) single pedestal desks, 42" x 32"; two (2) swivel chairs with arms and three (3) side chairs without arms to match desk. Two (2) full ball bearing suspension four (4) drawer vertical legal filing cabinets with locks and two (2) full ball bearing two (2) drawer vertical legal filing cabinets in each private office located below built-in desk.

    b. One (1) folding conference table, 96” x 30” and ten (10) folding chairs.

    c. Three (3) metal wastebaskets.

    d. One (1) fire extinguisher one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.

    e. One (1) Crystal Springs water cooler with bottled water, Model No. LP14058 or approved equal to be furnished for the duration of the Contract as required.

13. TRAILER TEMPORARY SERVICE: Plumbing and electrical Work required for the trailer will be furnished and maintained as below.

    a. PLUMBING WORK: The Contractor must provide temporary water and drainage service

connections to the DDC Field Office trailer for a complete installation. Provide all necessary soil, waste, vent and drainage piping.

Contractor to frost-proof all water pipes to prevent freezing.

1) REPAIRS, MAINTENANCE: The Contractor must provide repairs for the duration of the Project until the trailer is removed from the Site.

2) DISPOSITION OF PLUMBING WORK: At the expiration of the time limit set forth in sub-section 3.8 B 1 herein, the temporary water and drainage connections and piping to the DDC Field Office trailer must be removed by the Contractor and must be plugged at the mains. All piping must become the property of the Contractor for plumbing Work and must be removed from the Site, all as directed. All repair Work due to these removals must be the responsibility of the Contractor.

b. ELECTRICAL WORK:

1) The Contractor must furnish, install and maintain a temporary electric feeder to the DDC Field Office trailer immediately after it is placed at the job Site.

2) The temporary electrical feeder and service switch/fuse must be adequately sized based on the trailer load and installed per the New York City Electrical Code and complying with utility requirements.

3) Make all arrangements and pay all costs to provide electric service.

4) The Contractor must pay all costs for current consumed and for maintenance of the system in operating condition, including the furnishing of the necessary bulb replacements lamps, etc., for the duration of the Project and for a period of forty-five (45) Days after the date of Substantial Completion.

5) Disposition of Electric Work: At the expiration of the time limit set forth, the temporary feeder, safety switch, etc., must be removed and disposed of as directed.

6) All repair Work due to these removals must be the responsibility of the Contractor.

c. MAINTENANCE:

1) The Contractor must provide and pay all costs for regular weekly janitor service and furnish toilet paper, sanitary seat covers, cloth towels and soap and maintain the DDC Field Office in first-class condition, including all repairs, until the trailer is removed from the Site.

2) Supplies: The Contractor must be responsible for providing (1) all office supplies, including without limitation, pens, pencils, stationery, filtered drinking water and sanitary supplies, and (2) all supplies in connection with required computers and printers, including without limitation, an adequate supply of blank CD's/DVD's, storage boxes for blank CDs/DVDs, and paper and toner cartridges for the printer.

3) Risk of Loss: The entire risk of loss with respect to the DDC Field Office and equipment must remain solely and completely with the Contractor. The Contractor must be responsible for the cost of any insurance coverage determined by the Contractor to be necessary for the field office.

4) At forty-five (45) Days after the date of Substantial Completion, or sooner as directed by the Commissioner, the Contractors must have all services disconnected and capped to the satisfaction of the Commissioner. All repair Work due to these removals must be the responsibility of the Contractor.

d. TELEPHONE SERVICE: The Contractor must provide and pay all costs for the following

telephone services for the DDC Field Office trailer:

1) Separate telephone lines for one (1) desk phone in each private office.

2) One (1) wall phone (with six (6) foot extension cord) at plan table.

3) Separate telephone lines for the fax machine and internet access in each private office. Telephone service must include voice mail. All electronic voicemail messages must be automatically forwarded as email attachments, to allow for the voicemails to be played remotely.

4) A remote bell located on outside of trailer

5) The telephone service must continue until the trailer is removed from the Site.

e. SECURITY CAMERAS: Wi-Fi enabled security cameras must be provided at all entrances and exits, except for fire escapes / emergency stairwells, which do not require cameras. One security camera must be provided for the interior of the DDC Field Office, with the location to be determined by the Commissioner. Cameras must be minimum 1080p video resolution. Cameras must have internet cloud storage, with all videos stored for a minimum of two weeks. The cloud storage must be accessible via desktop or mobile. Cameras may be hardwired for power or battery powered; battery powered cameras must have the batteries changed by the Contractor as required to ensure no lapses of service. Signs must be posted indicating that the area is under video surveillance.

f. PERMITS: The Contractor must make the necessary arrangements and obtain all permits and pay all fees required for this Work.

C. RENTED SPACE: The Contractor has the option of providing, at its cost and expense, rented office or store space in lieu of trailer. Said space must be in the immediate area of the Project and have adequate plumbing, heating and electrical facilities. Space chosen by the Contractor for the DDC Field Office must be approved by the Commissioner before the area is rented. All insurance, maintenance and equipment, including computer workstations and security cameras specified in sub-section 3.8 D in quantities required as specified in sub-section 3.8 B 3 for the DDC Field Office trailer, must also apply to rented spaces.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 D

D. ADDITIONAL EQUIPMENT FOR THE DDC FIELD OFFICE:

1. Photocopying Machine: Stand-alone, heavy duty, electric, dry-process color photocopying type with color scan and send capability via email, a minimum production rate of seventy (70) pages per minute and an adequate supply of copy paper, toner, etc. The machine must be capable of duplex copying paper sizes of 8-1/2 x 11 inches, 8-1/2 x 14 inches and 11 x 17 inches, and have separate trays for each paper size. It must have a document feeder, collator, stapler, and the capability to reduce/enlarge copies between each paper size. The supply of each size copy paper, toner, etc. must be replenished and the machines must be maintained for the duration of the Contract by the Contractor as required by the Resident Engineer. Make and model can be Minolta, Canon, IBM, Epson, or an approved equivalent, and must be networked to the office computers for printing capability. Copier must remain at job Site until the DDC Field office trailer is removed from the Site.

2. The Contractor must furnish a fax machine and a telephone answering machine at commencement of the Project for the exclusive use of the DDC Field Office. All materials must be new, sealed in manufacturer's original packaging and must have manufacturers' warrantees. All items must remain the property of the City of New York at the completion of the Project.

3. COMPUTER WORKSTATION: The Contractor must provide one (1) complete computer workstation, in quantities specified in sub-section 3.8.B.3, as specified herein:

a. Hardware/Software Specification:

1) Computer Equipment: Computers must be provided for all Contracts that have a total Consecutive Calendar Days (CCD) for construction duration, as set forth in Schedule "A", of 180 CCD's or greater. Contracts of lesser duration must not require computers.

2) Computers furnished by the Contractor for use by City Personnel for the duration of the Contract must be in accordance with the Specific Requirements contained herein, must remain the property of the City of New York at the completion of the Project, and must meet the following minimum requirements:

3) Personal Computers – Personal Computers must meet the requirements of the US General Services Administration (GSA) Government-Wide Strategic Solutions (GSS) Standard Laptop, Desktop, and Tablet Specifications, V7. (Available online at https://hallways.cap.gsa.gov/)

   (a) Computer type for Personal Computers to be "Desktop Small Form Factor." Computer type for tablet to be "Tablet"
   (b) The following components listed as optional in the GSA specification must be provided with each personal computer: monitor, speakers, optical drive, smart card reader, webcam, and headset.
   (c) The following additional software must be provided with licenses for each computer:
      1. Adobe Acrobat Pro DC or Bluebeam Revu
      2. Microsoft Office Professional
      3. Autodesk AutoCAD LT
      4. Anti-virus software
      5. Microsoft Visio (only one license required per field office)

4) DDC Field Office Specs: DDC Field Offices requiring computers must be provided with the following:

   a) One (1) broad-band internet service account. See table below for minimum required upload and download speeds. Telephone service should be bundled together with Internet connectivity. Because of throughput requirements Verizon FIOS is the preferred connectivity provider where available.

Office Personnel #	Download Speeds (*Minimum*)	Upload Speeds (*Minimum*)
1 – 5	10 Mbps	15 Mbps
6 – 10	20 Mbps	15 Mbps
11 – 15	25 Mbps	15 Mbps
16 – 20	50 Mbps	15 Mbps

   This account will be active for the life of the Project. The e-mail name for the account must be the DDC Field Office/Project ID (preferably Gmail or Outlook e.g. ABC1234@gmail.com).

   b) One (1) 600 DPI HP Color Laser Jet Printer (twelve (12) pages per minute or faster) with one (1) Extra Paper (Legal Size) (Not required if photocopying machine prints in color).

   c) All necessary cabling for equipment specified herein

   d) Storage Boxes for Blank CD's

e) Printer Table

f) UPS/Surge Suppressor combo

g) Ten (10) USB Thumb (or Flash) Drives – sixteen (16) GB each

5) All computers required for use in the DDC Field Office must be delivered, installed, and setup in the Field Office by the Contractor.

6) All Computer Hardware must come with a three (3) year warranty for on-site repair or replacement. Additionally, and notwithstanding any terms of the warranty to the contrary, the Contractor is responsible for rectifying all computer problems or equipment failures within one (1) business day.

7) An adequate supply of blank CDs/DVDs, and paper and toner cartridges for the printer must be provided by the Contractor and must be replenished by the Contractor as required by the Resident Engineer.

8) It is the Contractor's responsibility to ensure that electrical service and phone connections are also available at all times; that is, the Field Office Computer(s) is to be powered and turned on twenty-four (24) hours each Day.

9) Broadband connectivity is preferred at each field office location. Please take into consideration that an extra phone line dedicated to the modem must be ordered as part of the Contract unless Internet broadband connectivity, via Cable or DSL, is available at the planned field office location. Any questions regarding this policy should be directed to the Assistant Commissioner of ITS at 718-391-1761.

E. HEAD PROTECTION (HARD HATS):

1. The Contractor must provide a minimum of ten (10) standard protective helmets for the exclusive use of DDC personnel and their visitors. Helmets must be turned over to the Resident Engineer and kept in the DDC Field Office.

2. Upon completion of the Project, the helmets must become the property of the Contractor.

F. PAYMENT FOR DDC FIELD OFFICE

1. The DDC Field Office will be paid monthly on a unit price basis.

2. MEASUREMENT. The quantity to be measured for payment under this item will be the number of months that the DDC Field Office is available for occupancy by the Commissioner during the period of the Project. Payment will begin the first month that the DDC Field Office is fully equipped, serviced as specified, and made available for occupancy. The DDC Field Office is to be continuously made available and monthly payments will continue for the duration of the Project through a period not to exceed 6 months past the Substantial Completion date. When directed in writing by the Commissioner, the DDC Field Office will be provided and paid for a period of time beyond 6 months past the Substantial Completion date. Payment for each month's occupancy after the date of Substantial Completion acceptance will be made as part of the final payment. Monthly payments may be terminated on a specified date prior to acceptance of the Project by written notification by the Commissioner that such office will no longer be required on the Project.

3. PRICE TO COVER. The unit price bid per month for the item DDC Field Office shall include the cost of furnishing all labor, materials, equipment, ground rental, fire and theft insurance, and utility charges necessary to complete the work of providing or constructing the field office; making all necessary electrical, water, sewer, and other connections required to make the above facilities operative; payment of all rental costs; furnishing and paying for heating fuel, as required; all electrical energy; private telephone services; staples, as specified; and all necessary incidentals to complete the work all in accordance with the specifications and the directions of the Commissioner.

3.9 MATERIAL SHEDS:

A. Material sheds used by the Contractor for the storage of its materials must be kept at locations which will not interfere at any time with the progress of any part of the Work or with visibility of traffic control devices.

B. The Contractor must store combustible materials apart from the facility.

3.10 TEMPORARY ENCLOSURES:

A. The Contractor must provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.

B. Where heating or cooling is needed and Permanent Enclosure is not complete, the Contractor must insulate temporary enclosures.

3.11 TEMPORARY PARTITIONS:

A. The Contractor must provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate occupied tenant areas from fumes and noise, including, but without limitation:

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Construct dustproof partitions with 2 layers of 3-mil (0.07-mm) polyethylene sheet on each side. Cover floor with two (2) layers of 3-mil (0.07-mm) polyethylene sheet, extending sheets eighteen (18) inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.
    a. Construct vestibule and airlock at each entrance through temporary partition with not less than forty-eight (48) inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
3. Insulate partitions to provide noise protection to occupied areas.
4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
5. Protect air-handling equipment.
6. Weather strip openings.
7. Provide walk-off mats at each entrance through temporary partition.

3.12 TEMPORARY FIRE PROTECTION:

A. The Contractor must install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with National Fire Protection Association (NFPA) Standard 241.

B. Smoking in all areas is prohibited.

C. The Contractor must supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

D. The Contractor must develop and supervise an overall fire-prevention and protection program for personnel at Project Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

E. The Contractor must provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.13

3.13 WORK FENCE ENCLOSURE:

A. The Contractor must furnish, erect and maintain a wood construction or chain-link fence to the extent shown on the Contract Drawings or required by the Work enclosing the entire Project on all sides. All materials used must be new. Any permit required for the installation and use of said fence and costs must be borne by the Contractor.

B. WOOD FENCE must be seven (7) feet high with framing construction of yellow pine, using 4" x 4" approved preservative-treated posts on not more than 6'-0" centers, with three (3) rails of at least 2" x 4" size to which must be secured minimum 1/2 inch thick exterior grade plywood. Posts must be firmly fixed in the ground at least 30" and thoroughly braced. Top edge of fence must be trimmed with a rabbeted edge mould. Provide on the street traffic sides of fence, observation openings as directed.

1. GATES: The Contractor must provide an adequate number of double gates, complete with hardware, located as approved by the Resident Engineer. Double gates must have a total clear opening of 14'-0" with two (2) 7'-0" hinged swinging sections. Hanging posts must be 6" x 6" and must extend high enough to receive and be provided with tension or sag rods for the swinging sections.

2. PAINTING: The fence and gates must be entirely painted on the street and public sides with one (1) coat of exterior primer and one (1) top coat of exterior grade acrylic-latex emulsion paint. Black stenciled signs reading "POST NO BILLS" must be painted on fence with three (3) inch high letters on twenty-five (25) foot spacing for the entire length of fence on street traffic sides. Signs must be stenciled five (5) feet above the sidewalk.

C. CHAIN-LINK FENCING must be minimum two (2) inch thick, galvanized steel, chain-link fabric fencing; eight (8) feet high with galvanized steel pipe posts; minimum 2-3/8-inch Outside Diameter (OD) line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Fence must be accurately aligned and plumb, adequately braced and complete with gates, locks and hardware as required. Under no condition must fencing be attached or anchored to existing construction or trees.

D. ADDITIONAL REQUIREMENTS:

1. It must be the obligation of the Contractor to remove all posters, advertising signs, and markings, etc., immediately.

2. Should the fencing be required to be relocated during the course of the Contract, it must be done by the Contractor at no additional cost to the City.

3. Where sidewalks are used for "drive over" purposes for Contractor vehicles, a suitable wood mat or pad must be provided for protection of sidewalks and curbs.

4. Where required, make provision for fire hydrants, lampposts, etc.

E. REMOVAL: When directed by the Resident Engineer, the fence must be removed.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.14

3.14 RODENT AND INSECT CONTROL:

A. DESCRIPTION: The Contractor must provide all labor, materials, plant and equipment, and incidentals required to survey and monitor rodent activity and to control any infestation or outbreak of rodents, rats, mice, water beetles, roaches and fleas within the Project area. Special attention should be paid to the following conditions or areas:

1. Wet areas within the Project area, including all temporary structures.
2. All exterior and interior temporary toilet structures within the Project area.
3. All Field Offices and shanties within the Project area of all subcontractors and DDC.
4. Wherever there is evidence of food waste and/or discarded food or drink containers, in quantity, that would cause breeding of rodents or the insects herein specified.
5. Any other portion of the Site requiring such special attention.

B. MATERIALS:

1. All materials must be approved by the New York State Department of Environmental Conservation (DEC) and comply with the New York City Health Code, OSHA and the laws, ordinances and regulations of state and federal agencies pertaining to such chemical and/or materials.

C. PERSONNEL:

1. All pest control personnel must be supervised by an exterminator licensed in categories 7A and 8.

D. METHODS:

1. Application and dosage of all materials must be done in strict compliance with the manufacturer's recommendations.
2. Any unsanitary conditions, such as uncollected garbage or debris, resulting from all Contractor's activities, which will provide food and shelter to the resident rodent population must be corrected by the Contractor immediately after notification of such condition by the Resident Engineer.

E. RODENT CONTROL WORK:

1. In wetlands, woodlands, and areas adjacent to a stream, special precautions must be taken to protect water quality and to ensure the safety of other wildlife. To prevent poisoned bait from entering streams, no poisoned bait must be used in areas within seventy-five (75) feet of all stream banks. Live traps must be used in these seventy-five (75) foot buffer zone areas and within wetland and woodland areas.
2. In areas outside the seventy-five (75) foot zone of protection adjacent to streams, and in areas outside wetlands and woodlands, tamper proof bait stations with poisoned bait must be placed during the period of construction and any consumed or decomposed bait must be replenished as directed.
3. At least one (1) month prior to initiation of the construction Work, and periodically thereafter, live traps and/or rodenticide bait in tamper proof bait stations, as directed above, must be placed at locations that do not allow access to pets, human beings, children and other non-target species, particularly wildlife (for example-birds) in the Project area.
4. The Contractor must be responsible for collecting and disposing of all trapped and poisoned rodents found in live traps and tamper-proof bait stations. The Contractor must also be responsible for posting and maintaining signs announcing the baiting of each particular location.
5. The Contractor must be responsible for the immediate collection and disposal of any visible rodent remains found on streets or sidewalks within the Project area.
6. It is anticipated that public complaints will be addressed to the Commissioner. The Contractor, where directed by the Commissioner, must take appropriate actions, like baiting, trapping, proofing, etc., to remedy the source of complaint within the next six (6) hours of normal working time which is defined herein for the purposes of this section as 7 A.M. to 6 P.M. on Mondays through Saturdays.
7. Emergency service during the regular workday hours (Monday through Friday) must be rendered within twenty-four (24) hours, if requested by the Commissioner, at no additional cost to the City.

F. EDUCATION & NOTICES:

1. The Contractor must post notices on all Construction Bulletin Boards advising workers, employees, and residents to call the DDC Field Office to report any infestation or outbreak of rodents, rats, mice, water beetles, roaches and fleas within the Project area. The Contractor must provide and distribute literature pertaining to Integrated Pest Management (IPM) techniques of rodent control to affected businesses and superintendents of nearby residential buildings to ensure their participation in maintaining their establishments free of unsanitary conditions, harborage removal and rodent proofing.

2. Prior to application of any chemicals, the Contractor must furnish to the Commissioner copies or sample labels for each pesticide, antidote information, and Material Data Safety Sheets (MSDS) for each chemical used.

G. RECORDS

1. The Contractor must keep a record of all rodent and waterbug infestation surveys conducted and make available, upon request, to the Commissioner. The findings of each survey must include, but not be limited to, recommended IPM techniques, like baiting, trapping, proofing, etc., proposed for rodent and waterbug pest control.

2. The Contractor must maintain records of all locations baited along with the type and quantity of rodenticide and insecticide bait used.

H. PAYMENT FOR RODENT AND INSECT CONTROL

1. Payment for rodent and inspect control will be made on a unit price basis.

2. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for rodent and insect control in accordance with these specifications.

3. The unit price bid per month for rodent and insect control must include the cost of furnishing all labor, materials, plant, equipment, insurance and incidentals required to provide rodent and insect control, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

3.15 PLANT PEST CONTROL REQUIREMENTS AND TREE PROTECTION REQUIREMENTS:

A. Plant Pest Control Requirements: The Contractor and its subcontractors, including the Certified Arborist described below, must comply with all federal and New York State laws and regulations concerning Asian Longhorned Beetle (ALB) management, including protocols for ALB eradication and containment promulgated by the New York State Department of Agriculture and Markets (NYSDAM). The Contractor is referred to: (1) Part 139 of Title 1 NYCRR, Agriculture and Markets Law, Sections 18, 164 and 167, as amended, and (2) State Administrative Procedure Act, Section 202, as amended.

1. All tree Work performed within the quarantine areas must be performed by NYSDAM certified entities. Transportation of all host material, living, dead, cut or fallen, inclusive of nursery stock, logs, green lumber, stumps, roots, branches and debris of a half inch or more in diameter from the quarantine areas is prohibited unless the Contractor or its subcontractor performing tree Work has entered into a compliance agreement with NYSDAM. The terms of said compliance agreement must be strictly complied with. Any host material so removed must be delivered to a facility approved by NYSDAM. For the purpose of this Contract, host material must be ALL species of trees.

2. Any host material that is infested with the ALB must be immediately reported to NYSDAM for inspection and subsequent removal by either State or City contracts, at no cost to the Contractor.

3. Prior to commencement of tree Work, the Contractor must submit to the Commissioner a copy of a valid ALB compliance agreement entered into with NYSDAM and the Contractor or its subcontractor

performing tree Work. If any host material is transported from the quarantine area the Contractor must immediately provide the Commissioner with a copy of the New York State 'Statement of Origin and Disposition' and a copy of the receipt issued by the NYSDAM approved facility to which the host materials are transported.

4. Quarantine areas, for the purpose of this Contract, must be defined as all five boroughs of the City of New York. In addition, prior to the start of any tree Work, the Contractor must contact the NYC Department of Parks & Recreation's (DPR) Director of Landscape Management at (718) 699-6724, to determine the limits of any additional quarantine areas that may be in effect at the time when tree Work is to be performed. The quarantine area may be expanded by federal and state authorities at any time and the Contractor is required to abide by any revisions to the quarantine legislation while working on this Contract. For further information please contact: NYSDAM (631) 288-1751.

B. Tree Protection Requirements: The Contractor must retain a Certified Arborist, as defined by DPR regulations, to provide the services described below.

1. Surveys and Reports: The Certified Arborist must, at the times indicated below, conduct a survey and prepare a plant material assessment report which includes: (1) identification, by species and pertinent measurements, of all plant material located on the Project Site, or in proximity to the Project Site, as described below, including all trees, significant shrubs and/or planting masses; (2) identification and plan for the containment of plant pests and pathogens, including the ALB, as described in paragraph A above; and (3) evaluation of the general health and condition of any infected plant material.

2. Frequency of Reports: The Certified Arborist must conduct a survey and provide a plant material assessment report at two (2) points in time: (1) prior to the commencement of construction Work; and (2) at the time of Substantial Completion. In addition, for projects exceeding twenty-four (24) months in duration, the Certified Arborist must conduct a survey and prepare a report at the midpoint of construction. Copies of each plant material assessment report must be submitted to the Resident Engineer within two (2) weeks of the survey.

3. Proximity to Project Site: Off-site trees, significant shrubs and/or planting masses must be considered to be located in proximity to the Project Site under the circumstances described below.

   a. The tree trunk, significant shrub, or primary cluster of stems in a planting mass is within fifty (50) feet of the project's Contract Limit Lines (CLLs) or Property Lines (PLs).

   b. Any part of the tree or shrub stands within fifty (50) feet of: (a) a path for Site access for vehicles and/or construction equipment; or (b) scaffolding to be erected for construction activity, including façade remediation projects.

   c. The Certified Arborist determines that the critical root zone (CRZ) of an off-site tree, significant shrub, or primary cluster of stems in a planting mass extends into the Project Site, whether or not that plant material is located within the fifty (50) foot inclusionary perimeter as outlined above.

4. Tree Protection Plan: The Certified Arborist must prepare, and the Contractor must implement, a Tree Protection Plan for all trees that may be affected by any construction Work, excavation or demolition activities, including without limitation: (1) on-site trees, (2) street trees, as defined below, (3) trees under DPR jurisdiction as determined by the NYC Department of Transportation, and (4) all trees that are located in proximity to the Project Site, as defined above. The Tree Protection Plan must comply with the DPR rules, regulations and specifications. The Contractor is referred to Chapter 5 of Title 56 of the Official Compilation of the Rules of the City of New York. Copies of the Tree Protection Plan must be submitted to the Resident Engineer prior to the commencement of construction. Implementation of the Tree Protection Plan for street trees and trees under DPR jurisdiction must be in addition to any tree protection requirements specified or required for the Project Site. For the purpose of this article, a "street tree" means the following: (1) a tree that stands in a sidewalk, whether

paved or unpaved, between the curb lines or lateral lines of a roadway and the adjacent property lines of the Project Site, or (2) a tree that stands in a sidewalk and is located within fifty (50) feet of the intersection of the Project's Site's PL with the street frontage property line.

C. No Separate Payment: No separate payment must be made for compliance with Plant Pest Control Requirements or Tree Protection Requirements. The cost of compliance with Plant Pest Control Requirements and Tree Protection Requirements must be deemed included in the Contractor's bid for the Project.

3.16 PROJECT IDENTIFICATION SIGNAGE:

A. The Contractor must provide, install and maintain Project identification and other signs where indicated to inform public and individuals seeking entrance to the Project.

B. In order to properly convey notice to persons entering upon a City construction Site, the Contractor must furnish and install a sign at the entrance (gates) as follows:

NO TRESPASSING

AUTHORIZED PERSONNEL ONLY

C. If no construction fence exists at the Site, this notice must be conveyed by incorporating the above language into safety materials (barriers, tape, and signs).

D. Provide temporary, directional signs for construction personnel and visitors.

E. Maintain and touch up signs so that they are legible at all times.

3.17 PROJECT CONSTRUCTION SIGN AND RENDERING:

A. PROJECT SIGN:

1. Responsibility: The Contractor must produce and install one (1) Project sign which must be posted and maintained upon the Project Site at a place and in a position directed by the Commissioner. The Contractor must protect the sign from damage during the continuance of Work under the Contract and must do all patching of lettering, painting and bracing thereof necessary to maintain the sign in first class condition and in proper position. Prior to fabrication, the Contractor must submit an 8-1/2" x 11" color match print proof from the sign manufacturer of the completed sign for approval by the Commissioner.

2. Sign Quality: The Contractor must provide all materials required for the production of the sign as specified herein. Workmanship must be of the best quality, free from defects and must be produced in a timely manner.

3. Schedule: Upon Project mobilization, the Contractor must commence production and installation of the sign.

4. Removal: At the completion of all Work under the Contract, the Contractor must remove and dispose of the Project sign away from the Site.

5. Sign construction:

   a. Frame: The frame must be from quality dressed 2"x2" pine, fire retardant, pressure treated lumber, that surrounds the inside back edge of the sign. The sign must have one (1) intermediate

vertical and two (2) diagonal supports, glued and screwed for rigidity. Frame must be painted white with two (2) coats of exterior enamel paint, prior to mounting of sign panel.

b. Edging: U-shaped, twenty-two (22) gauge aluminum edging, with a white enameled finish to match sign background, must run around entire edging of sign panel and frame. Corners must be mitered for a tight fit. Channel dimensions must be 1" inch (overlap to sign panel face) x 1 3/4" (or as required across frame depth) x 1" (back overlap).

c. Sign Panel: 4' x 8' panel must be constructed in one (1) piece of fourteen (14) gauge (.0785") 6061-T6 aluminum. This panel must be pre-finished both sides with a glossy white baked-on enamel finish and be flush with edge of 2" x 2" wood frame. Samples must be submitted for approval.

d. Fastening: Fasten sign panel to wood frame using cadmium plated no. 8 sheet metal screws at ½" below edge of panel and 8" on center. The U-shaped aluminum channel must be applied over the wood frame edge and fastened with cadmium plated no. 8 sheet metal screws at 12" on center around the entire perimeter.

6. Sign Graphics:

a. A digital file of the Project sign will be provided to the Contractor by the Commissioner's representative for printing. The Commissioner's representative must insert the Project name and names and titles of personnel (three (3) or more) and any other required information associated with the Project. All signs may include a second panel for a Project rendering as described in sub-section 3.17.B herein.

b. The digital file must be reproduced at the Sign Panel size of 4' x 8' on 3M High Performance Vinyl or approved equal. The 3M High Performance Vinyl or equivalent must be guaranteed for nine (9) years. Guarantee must cover fading, peeling, chipping or cracking. The sign manufacturer is required to maintain all specified Pantone Matching System (PMS) type and other composition elements represented in the digital file of the Project sign.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SETION 3.17 B

B. PROJECT RENDERING:

1. Responsibility: In addition to the Project sign, the Contractor must furnish and install one (1) sign showing a rendering of the Project. A digital file of the Project rendering will be provided to the Contractor by the Commissioner's representative. From an approved image file provided by DDC, the Project rendering is to be sized, printed, and mounted in an identical manner as described in sub-section 3.17.A above for the Project sign. A color match print proof from the sign manufacturer of the rendering sign printed from the supplied file is to be submitted to DDC for approval before fabrication. The rendering sign is to be posted at the same height as the Project sign. Where possible, the rendering sign must be mounted with a perfect match of the short sides of the rectangle so that the rendering sign and the Project sign together will create one long rectangle.

2. Removal: At the completion of all Work under the Contract, the Contractor must remove and dispose of the Project rendering away from the Site.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.18

3.18 SECURITY GUARDS/FIRE GUARDS ON SITE:

A. SECURITY GUARDS (WATCHMEN):

1. The Contractor must provide a competent security guard service on the Site, beginning on the date on which the Contractor commences actual construction Work, or on such earlier date on which there is activity at the Site related to the Work, including without limitation, delivery of materials or

construction set-up. The Contractor must continue to provide such security guard service until the date on which it completes all required Work at the Site, including all punch list Work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. Throughout the specified time period, there must be no less than one (1) security guard on duty every day, including Saturdays, Sunday and holidays, twenty-four (24) hours a day, except between the hours of 8:00 A.M. and 4:00 P.M. on any day that the Contractor is present. This exception during the working day must not apply after the finishing painting of the plaster Work is commenced; thereafter, not less than one (1) security guard must be on duty continuously, twenty-four (24) hours a day.

2. Every security guard must be required to hold a "Certificate of Fitness" issued by FDNY. Every security guard must, during his/her tour of duty, perform the duties of fire guard in addition to his/her security obligations.

3. Should the Commissioner find that any security guard is unsatisfactory, such guard must be replaced by the Contractor upon the written demand of the Commissioner.

4. Each security guard furnished by the Contractor must be instructed by the Contractor to include in his/her duties the entire construction Site including the Field Office, temporary structures, and equipment, materials, etc.

5. Should the Contractor or any other subcontractor consider the security requirements outlined above inadequate, the Contractor must provide such additional security as it thinks necessary, after obtaining the written consent of the Commissioner. The additional cost of such approved increased protection will be paid by the Contractor.

6. Nothing contained in this sub-section must diminish in any way the responsibility of the Contractor and each subcontractor for its own Work, materials, tools, equipment, nor for any of the other risks and obligations outlined hereinbefore in this Article.

B. COSTS: The Contractor must employ security guards/fire guards throughout the specified time period, except as otherwise modified by the detailed Specifications and as approved by the Commissioner, for the purpose of safeguarding and protecting the Site. All costs for security guards/fire guards must be borne by the Contractor.

C. RESPONSIBILITY: The Contractor and its subcontractors will be responsible for safeguarding and protecting their own work, materials, tools and equipment.

D. PAYMENT FOR SECURITY GUARDS

1. Payment for security guards will be made on a unit price basis.

2. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for security guards in accordance with these specifications.

3. The unit price bid per month for security guards must include the cost of furnishing all labor, materials, plant, equipment, insurance and incidentals required to provide security guards, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

3.19 SAFETY:

A. The Contractor, in compliance with requirements of Section 01 35 26, SAFETY REQUIREMENTS PROCEDURES, must provide and maintain all necessary temporary closures, guard rails, and barricades to adequately protect all workers and the public from possible injury. Any removal of these items, during the progress of the Work, must be replaced by the Contractor at no additional cost to the City.

END OF SECTION 01 50 00

(No Text This Page)

SECTION 01 54 11
TEMPORARY ELEVATORS AND HOISTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:
   1. Temporary Use, Operation and Maintenance of Elevators during Construction
      a. For new buildings up to and including fifteen (15) stories
      b. For new buildings over fifteen (15) stories
      c. For existing buildings
   2. Temporary Construction Hoists and Hoistways (For Material and Personnel)

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY

B. Section 01 42 00 REFERENCES

C. Section 01 50 00 TEMPORARY FACILITIES AND CONTROLS

D. Section 01 54 23 TEMPORARY SCAFFOLDS AND SWING STAGING

E. Section 01 77 00 CLOSE OUT PROCEDURES

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.1

3.1 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR NEW BUILDINGS UP TO AND INCLUDING FIFTEEN (15) STORIES:

A. INSTALLATION: The Contractor must install, complete, operate, and maintain in good working order, as indicated herein, one (1) selected main elevator for the transport of employees of the Contractor and/or its subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of Work at the Project. The Contractor must furnish, install, and maintain such elevator in good working order, including all necessary hoisting ropes, governor cables, traveling conductor cables, operating devices, temporary hand reset target annunciators, temporary signal devices, and all other permanent or temporary parts. The installation, operation and maintenance of the temporary elevator and all equipment and/or parts utilized in connection therewith must be in accordance with the rules and regulations of all agencies and/or entities having jurisdiction over elevators in temporary use.

B. RESPONSIBILITY: The Contractor must be responsible for any injury to persons or damage to property arising out of the temporary elevator and all equipment and/or parts utilized in connection therewith.

C. COSTS: The Contractor must be responsible for all costs in connection with the temporary elevator, including without limitation:

1. Installing and operating the temporary elevator;
2. Maintaining the temporary elevator in clean and proper operating condition, including the cost of lubricants and/or parts for such maintenance;
3. Performing all Work in pits, shaft ways and machine rooms necessary for the operation of the temporary elevator;
4. Replacing the temporary elevator or any equipment or parts utilized in connection therewith, if required, due to damage, destruction, or excessive wear or corrosion, except for the replacement of hoisting ropes as set forth below;
5. Performing all required electrical Work in connection with the temporary elevator;
6. Providing all electric power required to operate the temporary elevator;
7. Providing all necessary conduit and wiring connections for the proper operation and signaling of the temporary elevator; and
8. Providing all labor for the operation and maintenance of the temporary elevator, including on an overtime basis if necessary.

The total Contract price must include all costs in connection with the temporary elevator, including without limitation, the costs specified herein.

D. COMMENCEMENT OF SERVICE: The Contractor must begin to provide temporary elevator service using the selected main passenger elevator no later than eight (8) weeks (forty (40) Days) after the machine room roof slab, or that portion of it surrounding the elevator shaft, has been placed. No later than three (3) weeks (fifteen (15) Days) after the machine room roof slab has been placed, or that portion of it surrounding the elevator shaft, the following Work must be completed:

1. The shaft must be completely enclosed by either a permanent or temporary enclosure meeting all building code requirements.
2. The machine room must be completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary, must be provided to enable the safe and practicable hoisting of the elevator machinery for installation.
3. On all floors at the shaft way entrances to the elevator, the Contractor must install solid substantial frames, either sliding or swing doors with substantial hardware and door locks, and any necessary approved wire mesh barricades for adjacent shaft ways.
4. The Contractor must furnish and install solid, substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at the top of car and a substantial temporary door or gate on the front of the elevator entrance.

E. ELECTRICAL INSTALLATION: The Contractor, no later than twenty (20) Days after the machine room roof slab or that portion of it surrounding the elevator has been placed, must furnish and install temporary or permanent power and light feeders as required for the elevator used for temporary service. Additionally, the Contractor must connect such feeders to the terminals on the starter panels or controllers in the machine room to the low voltage transformers and car light outlets in the center of the shaft way and for the car control and signal traveling cables. The Contractor must make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.

F. REMOVAL: As directed by the Commissioner and when elevators for permanent use have been installed and are in proper condition for service, the Contractor must remove the temporary enclosures and all temporary elevator equipment and promptly proceed with the installation of the permanent equipment as required under the Contract.

G. INSPECTION: Before temporary elevator equipment is removed, a joint inspection of the equipment must be made by the Contractor and the Commissioner to determine the condition of this equipment upon the discontinuation of its temporary use. If this inspection deems it necessary, the Contractor must furnish and install new governor and compensating ropes, traveling cables, controller parts, etc. The car and counterweight safeties must be thoroughly cleaned of all dirt and all foreign matter, then properly lubricated and placed in good operating condition to the satisfaction of the Commissioner. If it is determined and ordered by the Commissioner that new hoist ropes are required, such ropes must be installed and payment will be made in accordance with Article 26 of the Contract.

H. REPLACEMENT: The Contractor must furnish and install new equipment or parts for any equipment or parts of the temporary elevator installation that have been damaged, destroyed, or that indicate excessive wear or corrosion, except for the replacement of hoisting ropes. All shaft ways, pits, motor rooms and sheave spaces used for temporary operation of elevators must be thoroughly cleaned. Where lubricated rails are used they must be washed down. If roller guides are used, all rust, dirt, etc., must be moved from the rails. The full cost of parts replacement, cleaning, etc., must be borne by the Contractor except for the replacement of hoisting ropes.

I. LIMITATIONS ON USE: The temporary elevator must not be used during its operation for the hoisting of materials or the removal of rubbish, but must be limited only to the transportation of employees of the Contractor and/or its subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of work at the Project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation. In the event of any damage to the temporary elevator, the Contractor must notify the Resident Engineer within twenty-four (24) hours after such damage has occurred. As indicated above, the Contractor must be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.

J. LIQUIDATED DAMAGES: The Contractor will be charged at the rate of one hundred dollars ($100) per Day for each Day it fails to provide the temporary elevator service described in this section beginning with the forty-first (41st) Day after the machine room roof slab, or that portion of it surrounding the elevator shaft, has been placed and stripped. This charge will be deducted from any amount due and owing to the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2

3.2 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR NEW BUILDING OVER FIFTEEN (15) STORIES:

A. INSTALLATION: The Contractor must install, complete, operate, and maintain in good working order, as indicated herein, two (2) selected main elevators for the transport of employees of the Contractor and/or its subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of work at the Project. The Contractor must furnish, install, and maintain such elevators in good working order, including all necessary hoisting ropes, governor cables, traveling conductor cables, operating devices, temporary hand reset target annunciators, temporary signal devices, and all other permanent or temporary parts. The installation, operation, and maintenance of the temporary elevators and all equipment and/or parts utilized in connection therewith must be in accordance with the rules and regulations of all agencies and/or entities having jurisdiction over elevators in temporary use. The two (2) elevators must not be operated simultaneously.

B. RESPONSIBILITY: The Contractor must be responsible for any injury to persons or damage to property arising out of the temporary elevators and all equipment and/or parts utilized in connection therewith.

C. COSTS: The Contractor must be responsible for all costs in connection with the temporary elevators, including without limitation:

1. Installing and operating the temporary elevators;

2. Maintaining the temporary elevators in clean, proper operating condition, including the cost of lubricants and/or parts for such maintenance;

3. Performing all Work in pits, shaft ways and machine rooms necessary for the operation of the temporary elevators;

4. Replacing the temporary elevators or any equipment or parts utilized in connection therewith, if required due to damage, destruction, or excessive wear or corrosion, except for the replacement of hoisting ropes as set forth below;

5. Performing all required electrical Work in connection with the temporary elevators;

6. Providing all electric power required to operate the temporary elevators;

7. Providing all necessary conduit and wiring connections for the proper operation and signaling of the temporary elevators; and

8. Providing all labor for the operation and maintenance of the temporary elevators, including on an overtime basis if necessary.

The total Contract price must include all costs in connection with the temporary elevators, including without limitation, the costs specified herein.

D. LOW RISE ELEVATOR: The Contractor must begin to provide temporary elevator service using one (1) selected main passenger elevator no later than six (6) weeks (thirty (30) Days) after the twelfth (12th) floor slab, or that portion of it surrounding the elevator shaft, has been placed and stripped. No later than one (1) week, (five (5) Days), after the twelfth (12th) floor slab, or that portion of it surrounding the elevator shaft, has been placed and stripped, the following Work must have been completed:

1. The shaft must be completely enclosed up to the twelfth (12th) floor by either the permanent or a temporary enclosure meeting the requirements of the law.

2. A temporary machine room enclosure must be provided at the eleventh (11th) floor and must be completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary, must be provided which will enable the safe and practicable hoisting of the elevator machinery for installation.

3. The Contractor must install on all floors up to and including the ninth (9th) floor at the shaft entrances to the elevator, solid substantial wood frames, either sliding or swing doors with substantial hardware and door locks, and any necessary approved wire mesh barricades for adjacent shaft ways.

4. The Contractor must furnish and install solid substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at top of car, except that the portion of the front at the elevator entrance must be provided with a substantial temporary door or gate.

E. ELECTRICAL INSTALLATION: The Contractor must, no later than ten (10) Days after the twelfth (12th) floor slab or that portion of it surrounding the elevator has been poured and stripped, furnish and install temporary or permanent power and light feeders as required for the elevator used for temporary service. The Contractor must connect such feeders to the terminals on the starter panels or controllers in the temporary machine room to the low voltage transformers, car light outlets in the center of the shaftway, and for the car control and signal traveling cables. The Contractor must make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.

F. HIGH RISE ELEVATOR: The Contractor must begin to provide temporary elevator service to all floors using a selected main passenger elevator no later than eight (8) weeks (forty (40) Days) after the machine room roof slab, or that portion of it surrounding the elevator shaft has been placed. No later than three (3) weeks (fifteen (15) Days) after the machine room roof slab, or that portion of it surrounding the elevator shaft has been placed, the following Work must have been completed:

1. The shaft must be completely enclosed by either the permanent or temporary enclosure, meeting the

requirements of the law.

2. The machine room must be completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary, must be provided to enable the safe and practicable hoisting of the elevator machinery for installation.

3. The Contractor must install on all floors at the shaft way entrances to the elevator solid substantial frames, either sliding or swing doors with substantial hardware and door locks, and any necessary approved wire mesh barricades for adjacent shaft ways.

4. The Contractor must furnish and install solid substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at top of car, except that the portion of the front at the elevator entrance must be provided with a substantial temporary door or gate.

G. ELECTRICAL INSTALLATION: The Contractor must, not later than twenty (20) Days after the machine room slab or that portion of it surrounding the elevator shaft has been placed, furnish and install temporary or permanent power and light feeders as required for the high-rise elevator to be used for temporary service. The Contractor must connect such feeders to the terminals on the motor-generator starter panels, or controllers in the machine room, to the signal circuits low voltage transformers for the annunciators and car light outlets in the center of shaft way. The Contractor must make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.

H. When the high-rise elevator is completed and ready for temporary operation, the low-rise temporary elevator must be shut down.

I. REMOVAL: When directed by the Commissioner and one (1) or more elevators for permanent use have been installed and are in condition for service, the Contractor must remove the temporary enclosures, all temporary elevator equipment, and promptly proceed with the installation of the permanent equipment as required under the Contract.

J. INSPECTION: Before temporary elevator equipment is removed, a joint inspection of the equipment must be made by the Contractor and the Commissioner to determine the condition of this equipment upon the discontinuation of its temporary use. If this inspection determines it necessary, the Contractor must furnish and install new governor and compensating ropes, new traveling cables, new controller parts, etc. The car and counterweight safeties must be thoroughly cleaned of all dirt and all foreign matter, then properly lubricated and placed in good operating condition to the satisfaction of the Commissioner. If it is determined and ordered by the Commissioner that new hoist ropes are required, such ropes must be installed and payment will be made in accordance with Article 26 of the Contract.

K. REPLACEMENT: The Contractor must furnish and install new equipment or parts for any equipment or parts of the temporary elevator installations that have been damaged, destroyed, or that indicate excessive wear or corrosion, except the replacement of hoisting ropes. All shaft ways, pits, motor rooms and sheaves spaces used for temporary operation of elevators must be thoroughly cleaned down. Where lubricated rails are used they must be washed down; if roller guides are used, all rust, dirt, etc., must be removed from the rails. The full cost of parts replacement cleaning, etc., must be borne by the Contractor except for the replacement of hoisting ropes.

L. LIMITATIONS ON USE: The temporary elevators must not be used during their operation for the hoisting of materials or the removal of rubbish, but must be limited only to the transportation of employees of the Contractor and/or its subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of Work at the Project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation, but only after such times as all plastering has been completed from the second floor up. In the event of any damage to the temporary elevator, the Contractor must notify the Resident Engineer within twenty-four (24) hours after such damage has occurred. As indicated above, the Contractor must be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.

M. LIQUIDATED DAMAGES: The Contractor will be charged at the rate of one hundred dollars ($100) per Day for each Day it fails to provide the temporary elevator service described in this Section beginning with the thirty-first (31st) Day after the twelfth (12th) floor slab, or that portion of the twelfth (12th) floor slab surrounding the elevator shaft, has been placed and stripped. This charge will be deducted from any amount due and owing to the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR EXISTING BUILDINGS:

A. The Contractor may use, at the Commissioner's discretion, one (1) selected elevator in the building for temporary operation by the Contractor for the transportation of employees of the Contractor and/or its subcontractors, representatives of DDC, and other governmental agencies having jurisdiction over the Work at the Project. The operation of the temporary elevator and all equipment and/or parts utilized in connection therewith must be in accordance with the rules and regulations of all agencies and/or entities having jurisdiction over elevators in temporary use.

B. RESPONSIBILITY: The Contractor must be responsible for any injury to persons or damage to property arising out of the temporary elevator and all equipment and/or parts utilized in connection therewith.

C. REPLACEMENT: The Contractor must furnish and install new equipment or parts for any equipment or parts of the elevator for temporary operation that have been damaged, destroyed, or that indicate excessive wear or corrosion, except the replacement of hoisting ropes. All shaft ways, pits, motor rooms and sheave spaces used for temporary operation of elevators must be thoroughly cleaned down. Where lubricated rails are used they must be washed down, if roller guides are used, all rust, dirt, etc., must be moved from the rails. The full cost of parts replacement, cleaning, etc., must be borne by the Contractor except for the replacement of hoisting ropes. If it is determined and ordered by the Commissioner that new hoist ropes are required, such ropes must be installed and payment will be made in accordance with Article 26 of the Contract.

D. LIMITATIONS ON USE: The temporary elevator must not be used during its operation for the hoisting of materials or the removal of rubbish, but must be limited only to the transportation of employees of the Contractor and/or its subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of Work at the Project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation. In the event of any damage to the temporary elevator, the Contractor must notify the Resident Engineer within twenty-four (24) hours after such damage has occurred. As indicated above, the Contractor must be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.

E. LIQUIDATED DAMAGES: The Contractor will be charged at the rate of one hundred dollars ($100) per Day for each Day it fails to provide elevator services described in this section beginning with fifteen (15) Days from Notice to Proceed (NTP). This charge will be deducted from any amount due and owing to the Contractor.

3.4 TEMPORARY HOISTS AND HOISTWAYS (FOR MATERIAL AND PERSONNEL):

A. RESPONSIBILITY: The Contractor must provide adequate numbers of material hoists for the most expeditious performance of all parts of the Work including the Work of all its subcontractors.

B. LOCATIONS: No hoists must be constructed at such locations as to interfere with, or affect the construction of, floor arches or the Work of subcontractors. The hoists may be located at the exterior sides of the structure or in the courtyard and extend upward adjacent to the line of window openings. The hoists must be located a sufficient distance from the exterior walls and be so protected as to prevent any of the permanent Work from being damaged, stained or marred.

C. ELEVATOR SHAFT: Wherever possible, one or more of the permanent elevator shafts may be used as temporary hoistways, providing such use complies with the requirements of the Building Code of the City of New York, has been approved by the Commissioner, and does not interfere with the progress of the Work.

D. PROTECTION FOR INTERIOR HOISTS: All interior material hoistways must be enclosed on each floor and must be adequately protected with appropriate safety guards. In no event must the protection be less than that required by law.

END OF SECTION 01 54 11

(No Text on This Page)

SECTION 01 54 23
TEMPORARY SCAFFOLDING AND PLATFORMS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. SECTION 01 35 26 SAFETY REQUIREMENTS PROCEDURES.

C. The Contractor must comply with the requirements of "*The City of New York Department of Design and Construction Safety Requirements".* This document is included in the Information for Bidders.

1.2 SUMMARY:

A. This Section includes administrative and general procedural requirements for Temporary Scaffolding and Platforms, including:

1. Conformance
2. Responsibility
3. Jobsite Documentation and Submittals
4. Inspections

B. This Section governs ALL scaffold used on DDC Project site(s), including but not limited to, Suspended Scaffold, Supported Scaffold, and Sidewalk Sheds.

1.3 CONFORMANCE:

A. Unless otherwise indicated, the Contractor is responsible for providing, erecting, installing, and maintaining all temporary scaffolding and platforms which must comply with requirements of Chapter 33 (Safeguards During Construction or Demolition) of the New York City (NYC) Building Code, NYC Local Law 52 of 2005, OSHA Construction Standard 1926 Subpart L, and furnishing the items and personnel set forth in this Section.

1.4 RESPONSIBILITY:

A. Jobsite Safety Coordinator: The Contractor must designate and employ a Jobsite Safety Coordinator, who must be a competent person, who must have a daily presence on the Project site during scaffold use. This designee must possess and maintain a valid New York City Department of Buildings (DOB) supported scaffold certificate of completion. An alternate must also be designated in the event that the Jobsite Safety Coordinator is absent. The Jobsite Safety Coordinator must:

1. Verify completeness of documentation and submittals (as described below);
2. Verify that inspections are performed, including pull tests (see below), reports are filed and reported deficiencies are corrected;
3. Monitor trades using scaffold;
4. Limit access to scaffold areas that are tagged for non-use;
5. Inform trades of scaffold load limitations;
6. Monitor loading of decks;
7. Verify that any ties that are temporarily removed are properly restored in the same shift;
8. Verify that outriggers and planks that are moved are properly set up and secured;
9. Verify that all scaffold decks in use have proper access/egress;
10. Verify that all open sides of decks in excess of 14 inches have proper guardrails and toe-boards;

11. Notify appropriate parties, including but not limited to the Resident Engineer, Site Safety Coordinator / Monitor, Site Safety consultant, scaffold users, Contractor and the Scaffold Engineer, of misuses, non-conformances, hazards and accidents; and,
12. Keep a log of significant actions and events connected with the scaffolding.

B. The Contractor will be responsible for erecting, maintaining, and dismantling the scaffolding and/or sidewalk shed in conformance with requirements of the NYC Building Code, OSHA and the Contract Documents, including the Specifications. The Contractor must also be guided by generally accepted standards of scaffold industry practice as promulgated by the Scaffold Industry Association.

C. The Contractor must require the subcontractor responsible for erecting the scaffolding to engage a Scaffold Engineer, licensed as a professional engineer by the State of New York. The Scaffold Engineer will be responsible to ensure the following: (1) that the installation design is in compliance with requirements of the NYC Building Code and OSHA, (2) that the design comports with the capabilities of the components and the characteristics of the site, (3) that scaffold loads on the host building, including netting, have been properly considered, and (4) that the design documents provide accurate information for erectors and users.

D. Scaffold users are trade contractors assigned to work on the scaffold. Training certificates from a DOB-approved training provider are mandatory. These users have a duty to become familiar with the NYC Building Code and OSHA requirements germane to users, to obey the instructions of the Jobsite Safety Coordinator, and to inform the Jobsite Safety Coordinator of known hazards, non-conformances, or violations.

1.5 JOBSITE DOCUMENTATION AND SUBMITTALS:

A. The Contractor must prepare, obtain, and submit the following to the Commissioner:

1. NYC DOB permit(s) for scaffold and sidewalk sheds (as applicable) including filing applications signed and sealed by a Professional Engineer licensed in the State of New York;
2. Site logistics plan / site safety plan;
3. Installation drawing(s), design, and product data to be provided for **all** scaffold(s) and shed(s) must include, at a minimum:
    a. Plan(s);
    b. Elevation(s);
    c. Duty load designation: “standard” (150 psf live load) or “heavy duty” (300 psf live load);
    d. Details including base support, anchors and ties;
    e. Notes and specifications including load limits, number of planked levels, tie spacing, netting, and sequence of installation and removal;
    f. Anchorage into sound material;
    g. Load limits based on pull tests;
    h. Specifications for pull test(s), method, proof load and the number of trials;
    i. Elevations, levels or heights, where anchorage is made into masonry;
    j. Specifications for frames, planks, screw jacks, anchors, and any other ancillary hardware;
    k. Samples for anchors, ties and netting;
    l. Sequence of operations for erection and demolition;
    m. Location plan, heights, widths, “jumps” over doorways and driveways;
    n. Specify size, maximum span and maximum spacing of headers and stringers;
    o. Specify legs, girts, braces, nailing and connections; and,
    p. All sidewalk sheds must be designed, engineered, signed, and sealed by a Professional Engineer licensed in the State of New York.
        i. Generic (not job-specific) engineering drawings are satisfactory for standard sheds and arrangements.

ii. Special engineering is required for custom sheds, site-specific problems or non-standard arrangements.

1.6 INSPECTIONS:

A. Signed inspection reports must be issued for each inspection and pull-test below, and must be logged and maintained on site by the Jobsite Safety Coordinator for the duration of the Project.

B. Pull testing will be required during design, and during or post erection, where anchorage is made into masonry. The Scaffold Engineer must specify the test method, proof load, and the number of trials.

C. Sidewalk sheds must be inspected after initial installation, major modification, or damage and thence every three months. Inspections must be by a Scaffold Engineer for custom sheds and by a Competent Person employed by the Contractor for standard sheds.

D. Scaffolds must be inspected by the Scaffold Engineer during erection, post-erection, and prior to use and thence every three (3) months. The Scaffold Engineer must repeat inspections after major alteration/ modification, and/or damage.

E. A Qualified Person assigned by the Contractor must inspect: the progress of erection and dismantling; and, the condition and integrity of the sidewalk sheds after high winds, major storms, and at least once per month during usage.

F. A Qualified Person assigned by the Contractor must inspect: the progress of erection and dismantling at least weekly; and, the condition and integrity of the scaffold after high winds, major storms, and at least once per month during usage.

G. Scaffolds and Sidewalk Sheds must be inspected daily by the Jobsite Safety Coordinator or alternate, prior to use by scaffold users. The inspection results must be recorded in the maintenance log and must always be available on-site.

H. At the completion of the Project, submit all inspection documents as Miscellaneous Record Documents in accordance with SECTION 01 78 39 CONTRACT RECORD DOCUMENTS.

1.7 LADDERS AND STAIRS:

A. The Contractor must provide and maintain ladders or temporary stairs extending from the street to the first story, and to and from every floor and roof level of the Project.

1.8 ACCESS AND EXITS:

A. The ladders or temporary stairs must be of acceptable size, number and location, so that proper and convenient access may be had by those required to proceed to and from all parts of the Project.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.9

1.9 PAYMENT FOR SIDEWALK SHEDS:

A. Payment for sidewalk sheds will be made on a unit price basis.

B. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for sidewalk sheds in accordance with these specifications.

C. The unit price bid per month for sidewalk sheds must include the cost of furnishing all labor, materials, plant, equipment, insurance and incidentals required to provide sidewalk sheds, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 54 23

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 RELATED SECTIONS:

A. Section 01 42 00 REFERENCES for applicable industry standards for products specified.

1.4 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved by Commissioner through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics are listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure.

1.5 ACTION SUBMITTALS

A. Product Specification Submittals: Comply with requirements in Section 01 33 00 SUBMITTAL PROCEDURES. Show compliance with requirements.

B. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Review Action: If necessary, Commissioner will request additional information or documentation for evaluation and will notify Contractor of approval or rejection of proposed comparable product request.

    a. Format of Approval of Submittal: Per Article 1.6 of Section 01 33 00 SUBMITTAL PROCEDURES.
    b. Use product specified, or products by Manufacturers specified if Commissioner does not issue a decision on use of a comparable product request.

1.6 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

3. See individual identification sections in Divisions 21, 22, 23, and 26 for additional identification requirements.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
5. Protect stored products from damage and liquids from freezing.

1.8 PRODUCT WARRANTIES

A. Warranties specified in other Sections will be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of Guaranty obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to the City of New York.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for the City of New York.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 CLOSEOUT PROCEDURES.

PART II – PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Descriptive, performance, and reference standard requirements in the Specifications establish required characteristics of products.
2. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
3. Commissioner will review and approve products with warranties meeting the requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Commissioner will make selection.

B. Or Approved Equal:

1. Comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product, or for use of a product by an unnamed Manufacturer, as designated by the term "Or approved equal".

2. Submit additional documentation required by Commissioner, in order to establish equivalency of proposed products. Evaluation of "Or approved equal" product status is by the Commissioner, whose determination is final.

C. Product Selection Procedures:

1. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products will be considered. Comply with requirements in "Comparable Products" Article for consideration of a product by an unnamed manufacturer. Products' listing is indicated by the following:

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) Manufacturer; Product designation
        2) Manufacturer; Product designation
        3) Manufacturer; Product designation
        4) Or approved equal

2. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed. Comparable products from unnamed Manufacturers will be considered. Comply with requirements in "Comparable Products" Article for consideration of a product by an unnamed manufacturer. Manufacturer's listing is indicated by the following:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Manufacturer
        2) Manufacturer
        3) Manufacturer
        4) Or approved equal

3. Basis-of-Design Product: Where Specifications name a basis-of-design product, provide the specified product, or a comparable product by one of the other named manufacturers. Drawings may indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Specifications indicate performance requirements and physical properties, durability and other special and required features that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers. Basis-of-Design Product listing is indicated by the following:

    a. Subject to compliance with requirements, provide [product indicated on Drawings] [manufacturer's name; product name or designation] or comparable product by one of the following:

        1) Manufacturer
        2) Manufacturer
        3) Or approved equal

4. Sole Source Product (Single Proprietary): Where Specifications name a single manufacturer and product, provide the named product. A Sole Source Product selection requires prior request by the Design Consultant and approval by the Commissioner for its inclusion in specifications. Sole Source Product is indicated by the following phrase listing:

    a. Sole Source Product: Manufacturer's name and Product designation.

        1) No substitutions Permitted.

D. Visual Matching Specification: Where Specifications require "match Commissioner's sample," provide a product that complies with requirements and matches Commissioner's sample. Commissioner's decision will be final on whether a proposed product matches.

E. Visual Selection Specification: Where Specifications include the phrase "as selected by Commissioner from manufacturer's full range" or similar phrase, select a product that complies with requirements. Commissioner will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products (Or Approved Equal): Commissioner will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Commissioner may return requests without action, except to record noncompliance with these requirements:

B. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.

C. Evidence that proposed product provides specified warranty.

D. List of similar installations for completed projects with project names and addresses and names and addresses of architects and Owners, if requested.

E. Samples, if requested.

F. Submittal Requirements: Approval by the Commissioner of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements.

G. Comply with all other specified product and submittal requirements.

PART III – EXECUTION (Not Used)

END OF SECTION 016000

SECTION 01 73 00
EXECUTION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes general procedural requirements governing execution of the Work including without limitation the following:

1. Delivery of Materials
2. Contractor's Superintendent
3. Surveys
4. Borings
5. Examination
6. Environmental Assessment
7. Preparation
8. Deferred Construction
9. Installation
10. Permits
11. Transportation
12. Sleeves and Hangers
13. Sleeve and Hanger Drawings
14. Cutting and Patching
15. Location of Partitions
16. Furniture and Equipment
17. Removal of Rubbish and Surplus Material
18. Cleaning
19. Security and Protection of Work Site
20. Maintenance of Site and Adjoining Property
21. Maintenance of Project Site
22. Safety Precautions for Control Circuits
23. Obstructions in Drainage Lines
24. Payment for Allowances
25. Correction of the Work

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
C. Section 01 33 00 SUBMITTAL PROCEDURES
D. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT & DISPOSAL
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Design Consultant	The entity responsible for providing design services for the Project, including, without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 QUALITY ASSURANCE:

A. Land Surveyor Qualifications: A professional land surveyor who is licensed in the State of New York and who is experienced in providing land-surveying services of the kind indicated.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION

3.1 DELIVERY OF MATERIALS:

A. Material Orders: The Contractor must furnish to the Commissioner a copy of each material order, indicating date of order and quantity of material, and must also notify the Commissioner when materials have been delivered to the Site and in what quantities.

B. Ample Quantities: The Contractor must deliver materials in ample quantities to ensure the most prompt and uninterrupted progress of the Work so as to complete the Work within the Contract time.

C. Containers: The manufacturer's containers must be delivered with unbroken seals and must bear proper labels.

D. Deliveries: The Contractor must coordinate deliveries in order to avoid delaying or impeding the progress of the Work.

E. Handling: The Contractor must provide equipment and personnel to handle products by methods to prevent soiling or damage.

1. Promptly inspect shipments to assure products comply with requirements, quantities are correct, and products are undamaged.

2. Promptly return damaged shipments or incorrect orders to manufacturer.

3. For materials or equipment to be reused or salvaged, use special care in removal, storage and reinstallation to insure proper function in completed Work.

F. Storage: Store products in accordance with provisions of Article 3.1 of the Standard Construction Contract, and periodically inspect to assure that stored products are undamaged and are maintained under required conditions.

G. Stacking: All materials must be properly stacked in convenient places adjacent to the Site, or where directed, and protected in a satisfactory manner. Stacked materials must be arranged so as to not interfere with visibility of traffic control devices.

H. Overloading: If the Commissioner permits the storage of materials in any part of the Project area, they must be so stored as to cause no overloading.

I. No Interference: If it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the Work or interfering with the Work to be done by any trade subcontractor, the Contractor must remove and restack such materials at no additional cost to the City.

3.2 CONTRACTOR'S CONSTRUCTION SUPERINTENDENT:

A. Contractor's Construction Superintendent: The Contractor must devote its time and personal attention to the Work and must employ and retain at the Project Site, from commencement until Final Acceptance, a Contractor's Construction Superintendent. The Contractor's Construction Superintendent must be registered with the New York City Department of Buildings (DOB) in compliance with the Construction Superintendent Rule of the City of New York, be competent and capable of maintaining proper supervision and care of the Work, and be acceptable to the Commissioner. The Construction Superintendent, in the absence of the Contractor, and irrespective of any superintendent or foreman employed by any subcontractor, must see that the instructions of the Commissioner are carried out.

B. Replacement: The Contractor's Construction Superintendent on the job must not be changed or removed without the consent of the Commissioner.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 SURVEYS:

A. Line and Grade: The City will establish a baseline and bench mark near the Site of the Work for use by the Contractor in connection with the performance of the Work.

B. Responsibility: The Contractor must establish all other lines and elevations required for the Work and must be solely responsible for the accuracy thereof.

C. Safeguard All Points: The Contractor must safeguard all points, stakes, grade marks and bench marks made or established by the Contractor on the Work. The Contractor must re-establish same if disturbed, and bear the entire expense of rectifying the Work if improperly installed due to not maintaining, protecting or removing without authorization from the Commissioner such established points, stakes, or marks.

D. City Monuments and Markers: No Work must be performed near City monuments or markers so as to disturb them until the said monuments or markers have been referenced or reset or otherwise disposed of by the relevant Agency or party who installed them.

E. Foundations: The Contractor must furnish certification from a licensed Surveyor that all portions of the foundation Work are located in accordance with the Contract Drawings and at the elevations required thereby. This certification must show the actual locations and the actual elevations of all the Work in relation to the locations and elevations shown on the Contract Drawings, including, but not restricted to the following:

1. The locations and elevations of all piles, if any.
2. Elevations of tops of all spread footings, tops of pile caps, and tops of all foundation walls, elevator pit walls and ramp walls.
3. Location of all footing centers and pier centers including those for exterior wall columns.
4. Location of all foundation walls including wall columns, elevator pit walls and ramp walls.

F. Wall Lines: After the first courses of masonry or stone have been laid, the Contractor must establish the permanent lines of exterior walls. The Contractor must promptly furnish certification from a licensed Surveyor in the form of signed original drawings showing the exact location of such wall lines of all portions

of all structures. Except at its own risk, the Contractor must not proceed further with the erection of walls until the Surveyor's certification has been submitted and verified for correct location of wall lines.

G. Surveyor: The Surveyor selected for any of the purposes mentioned in Paragraph E and Paragraph F above, and Paragraph I below, must be a land Surveyor licensed in the State of New York and must be subject to the approval of the Commissioner. The Surveyor must not be a regular employee of the Contractor, nor must the Surveyor have any interest in the Contract. The Surveyor's certification must represent an independent and disinterested verification of all layout. The Surveyor must report to the Department of Design and Construction's (DDC) Resident Engineer each time upon arrival to and departure from the Site and review with the Resident Engineer the data required for the Project.

H. Final Certification: Final certification must be submitted upon completion of the Work or upon completion of any subdivision of the Work as directed by the Commissioner. Any exceptions or deviations from the Contract Drawings must be noted on the final certificate and must include any maps, plates, notes, pertinent documents and data necessary, in the opinion of the Commissioner, to constitute a full and complete report.

I. Final Survey: The Contractor must submit to DDC for submission to DOB a final Survey by the licensed Surveyor showing the location of the new Work, before completion of the Work. This Survey must show the location of the first tier of beams or of the first floor; the finish grades of the open spaces on the plot; the established curb level and the location of all other Work on the plan, together with the location and boundaries of the lot or plot upon which the Work is constructed, curb cuts, all yard dimensions, etc.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4

3.4 BORINGS:

A. The work of this article must be the responsibility of the Contractor unless otherwise indicated.

B. Reference Drawings: The boring drawings as listed on the title sheet are for information to the bidder and are to be used under the conditions as follows:

1. Boring logs: shown on the boring drawings, record information obtained under engineering supervision in the course of exploration carried out by or under the direction of DDC at the Site.

2. Soils and Rock Samples: All inferences are drawn from the indications observed as made by engineering and scientific personnel. All such inferences and all records of the Work, including soil samples and rock cores, if any, are available to bidders for inspection.

3. Certification of Samples: The City certifies that the Work was carried out as stated, and that the soil samples and rock cores were actually taken from the site at the times, places, and in the manner indicated on the boring drawings. The samples are available for inspection in DDC’s Subsurface Exploration Unit.

4. Bidder’s Responsibility: The bidder, however, is responsible for any conclusions to be drawn from the Work. If the bidder accepts those of the City, it must do so at its own risk. If the bidder prefers not to assume such risk, the bidder is under the obligation of employing its own experts to analyze the available information and must be responsible for any consequences of acting on their conclusions.

5. Continuity Not Guarantee: The City does not guarantee continuity of conditions shown at actual boring locations over the entire Site. Where possible, borings are located to avoid all obstructions and previous construction which can be found by inspection of the surface. The bidder is required to estimate the influence of such features from its own inspection of the Site.

3.5 EXAMINATION:

A. Existing Conditions: The existence and location of Site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning the Work, the Contractor must investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, the Contractor must verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground utilities and other construction indicated as existing are not guaranteed. Before beginning Site Work, the Contractor must investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, the Contractor must verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, water-service piping, and underground electrical services.
2. The Contractor must furnish location data for Work related to the Project that must be performed by public utilities serving the Project Site.

C. Acceptance of Conditions: Examine all existing substrates, areas, equipment, and conditions, with the subcontractor responsible for purchase of equipment, installation or application, for compliance with requirements for installation tolerances, equipment compatibility, and other conditions affecting performance. The Contractor must record observations of these examinations:

1. Verify compatibility with and suitability of substrates and equipment, including compatibility with existing finishes, primers, electrical services, and mechanical equipment.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces, equipment, and conditions.

3.6 ENVIRONMENTAL ASSESSMENTS:

A. City Responsibilities: An Environmental Assessment and survey is performed by DDC and its findings are included in the Contract Documents. In accordance with the NYC Administrative Code Title 15 Chapter 1, an asbestos survey is required to be performed by an Asbestos Investigator certified by the NYC Department of Environmental Protection (DEP) to identify the presence of asbestos containing material (ACM) prior to any alteration, renovation, or demolition activity. The findings of such survey are required for the submission of approvals and permits issued by DOB. When the findings indicate that asbestos containing material is present and will be disturbed during the alteration, renovation, or demolition activity, then abatement design specifications will be incorporated into the Contract Documents. The Contractor must comply with all federal, state and local asbestos regulations affecting the work for this Contract.

B. Contractor Responsibility: The Contractor must comply with all federal, state and local environmental regulations, including without limitation, United States Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) regulations, which require the Contractor to assess if lead-based paint will be disturbed during the Work in order to protect the Contractor's workers and the building occupants from migration of lead dust into the air. The Contractor must comply with all federal, state and local environmental waste disposal regulations which may be required during the Work. The Contractor is required to hire licensed abatement and disposal companies for the requisite Work.

3.7 PREPARATION:

A. Field Measurements: The Contractor must verify all dimensions and conditions on the Site so that all Work will properly join the existing conditions.

B. Before commencing the Work, the Contractor must examine all adjoining materials on which its Work is in any way dependent on good workmanship in accordance to the intent of the Specifications and the Contract Drawings. The Contractor must report to the Commissioner any condition that will prevent it from performing Work that conforms to the required Specifications.

C. Existing Utility Information: The Contractor must furnish information to the Commissioner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Additionally, the Contractor must coordinate with authorities having jurisdiction.

D. Space Requirements: The Contractor must verify space requirements and dimensions of items shown diagrammatically on the Contract Drawings.

3.8 DEFERRED CONSTRUCTION:

A. In order to permit the installation of any item or items of equipment required to be furnished and installed within the time allowed for completing the Work of the Contract, the Contractor must defer construction Work limited to adequate areas as approved and certified by the Commissioner.

B. The Contractor must confer with the affected trade subcontractors and ascertain arrangements, time, and facilities necessary to be made by the Contractor in order to execute the provisions specified herein.

3.9 INSTALLATION:

A. General: The Contractor must locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical Work plumb and make horizontal Work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated on the Contract Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory-prepared and field-installed. Check shop drawings of other work and work of trade subcontractors to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by the Design Consultant.

2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral

anchors that are to be embedded in concrete or masonry. Deliver such items to Project Site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.10 PERMITS:

A. The Contractor must comply with all local, state and federal laws, rules, and regulations affecting the Work of this Project, including, without limitation, (1) obtaining all necessary permits for the performance of the Work prior to commencement thereof, and (2) complying with all requirements for the disposal of demolition and/or construction debris, waste, etc., including disposal in City landfills. The Contractor must be responsible for all costs in connection with such regulatory compliance, unless otherwise specified in the Contract.

3.11 TRANSPORTATION:

A. Availability: The Contractor must determine the availability of transportation facilities and dockage for the use of its employees, equipment, and materials, and the conditions under which such use will be permitted.

B. Costs: If transportation facilities and dockage are available and are permitted to be used by the governmental agency having jurisdiction, the Contractor must pay all necessary costs and expenses, and abide by all rules and regulations promulgated in connection therewith.

C. Vehicles: With respect to the use of vehicles on highways and bridges, the Contractor's attention is directed to the limitations set forth in the Rules of the City of New York, Title 34, Chapter 4, Section 4-15.

D. Continued Use: It is understood that the Commissioner makes no warranty as to the continued use by the Contractor of such facilities.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.12

3.12 SLEEVES AND HANGERS:

A. Coordinate with Progress Schedule: The Contractor must promptly furnish and install conduits, outlets, piping sleeves, boxes, inserts and all other materials and equipment that is to be built into the Work in conformity with the requirements of the Project.

B. Cooperation of Subcontractors: All subcontractors must fully cooperate with each other in connection with the performance of the above Work as "cutting in" new work is neither contemplated nor will it be tolerated.

C. Timeliness: To avoid delay, in the event that timely delivery of sleeves and other materials cannot be made, the Contractor may arrange to have boxes or other forms set at the locations where the piping or other material is to pass through or into the slabs, walls or other Work. Upon the subsequent installation of the sleeves or other material, the Contractor must fill around them with materials as required by the Contract. The necessary expenditures incurred for the boxing out and filling in must be borne by the Contractor.

D. Inserts: The Contractor is to install strip inserts four (4) foot on center and perpendicular to beams in ceiling slabs of boiler, machine, and mechanical equipment rooms. Inserts are to be installed for strippable concrete slabs only.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.13

3.13 SLEEVE AND PENETRATION DRAWINGS:

A. As soon as practicable after the commencement of Work, and when the order in which concrete for the first slabs, walls, etc. to be poured is determined, the Contractor must submit to DDC a sketch indicating the location and size of all penetrations for sleeves, ducts, etc. which will be required to accommodate the mechanical trades in order to determine if such penetrations will materially weaken the Project's structure.

The sketch must be stamped and returned if approved and/or comments will be transmitted. The Contractor must continue to submit sketches as the pouring schedule and the concrete Work progresses and until approvals for the penetration sketches have been given. The Contractor must not predicate its layout Work on unapproved sketches.

3.14 CUTTING AND PATCHING:

A. Responsibility: The Contractor must do all cutting, patching, and restoration required by its Work, unless otherwise particularly specified in the Specifications.

B. Restore Work: The Contractor must restore any Work damaged during the performance of the Work.

C. Competent Workers: All restoration Work must be done to the satisfaction of the Commissioner by competent workers skilled in the trade required by such restoration. If, in the judgment of the Commissioner, workers engaged in restoration Work are incompetent, they must be replaced immediately by competent workers.

D. Structural Elements: Do not cut and patch structural elements without the prior approval, in writing, of the Resident Engineer.

E. Operational Elements: Do not cut and patch operating elements and related components.

F. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Commissioner's opinion, reduce the building's aesthetic qualities. The Contractor must remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

G. Existing Warranties: The Contractor must remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

H. Removals: The Contractor must remove from the premises all demolished materials of every nature or description resulting from cutting, patching, and restoration work, in accordance with the requirements hereinafter stipulated under Sub-Section 3.17 herein and as further required in Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.15

3.15 LOCATION OF PARTITIONS:

A. Within three (3) weeks after the concrete slabs have been poured on each floor level, the Contractor must immediately locate accurately all of the partitions, including the door openings, on the floor slabs in a manner approved by the Resident Engineer.

3.16 FURNITURE AND EQUIPMENT:

A. Responsibility: The Contractor is responsible for moving all loose furniture and/or equipment in all areas where the location of such furniture and/or equipment interferes with the proper performance of its Work.

B. Protection: All such furniture and/or equipment must be adequately protected with dust cloths and returned to their original locations when directed to do so by the Resident Engineer.

3.17 REMOVAL OF RUBBISH AND SURPLUS MATERIALS:

A. Of the waste that is generated during demolition, as many of the waste materials as economically feasible must be reused, salvaged, or recycled. Waste disposal in landfills must be minimized. Comply with requirements of Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Rubbish: Rubbish must not be thrown from the windows or other parts of the Project. Mason's rubbish, dirt and other dust-producing material must be wetted down periodically.

C. Location: The Contractor must clean the Project Site and Work area daily, sweep up, and deposit at a location designated on each floor, all of its rubbish, debris, and waste materials as it accumulates or more frequently when directed by the Resident Engineer. Wood crating must be broken up, neatly bundled, tied, and stacked ready for removal and be deposited at a location designated on each floor.

1. Comply with requirements in NYC Fire Department for removal of combustible waste materials and debris.

2. Do not hold materials more than seven (7) Days during normal weather or three (3) Days if the temperature is expected to rise above 80 degrees F (27 degrees C).

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

D. Laborers: Since the Contractor is responsible for the removal of all rubbish, etc., from the Site, the Contractor must employ and keep engaged for this purpose an adequate number of laborers.

E. Surplus Materials: The Contractor must remove from the Site all surplus materials when there is no further use for same.

F. Tools and Materials: At the conclusion of the Work, all erection plant, tools, temporary structures and materials belonging to the Contractor must be promptly removed.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

3.18 CLEANING:

A. The Contractor must thoroughly clean all equipment and materials furnished and installed, and must deliver such materials and equipment undamaged in a clean and new appearing condition up to date of Final Acceptance.

B. Site: Maintain Project Site free of waste materials and debris.

C. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of the product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration up to date of Final Acceptance.

F. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration up to date of Final Acceptance.

3.19 SECURITY AND PROTECTION OF WORK SITE:

A. Provide protection of installed Work, including appropriate protective coverings, and maintain conditions that ensure installed Work is without damage or deterioration up to date of Final Acceptance.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

C. Secure and protect Work and Work Site against damage, loss, injury, theft and/or vandalism.

D. Maintain daily sign-in sheets of workers and visitors and make the sheets available to the Commissioner.

3.20 MAINTENANCE OF SITE AND ADJOINING PROPERTY:

A. The Contractor must take over and maintain the Project Site, after order to start Work.

B. The Contractor must be responsible for the safety of the adjoining property, including sidewalks, paving, fences, sewers, water, gas, electric and other mains, pipes and conduits etc. until the date of Final Acceptance. The Contractor must, at its own expense, except as otherwise specified, protect same and maintain them in at least as good a condition as that in which the Contractor finds them.

C. All pavements, sidewalks, roads and approaches to fire hydrants must be kept clear at all times, maintained and repaired to serviceable condition with materials to match existing.

D. Provide and keep in good repair all bridging and decking necessary to maintain vehicular and pedestrian traffic.

E. The Contractor must also remove all snow and ice as it accumulates on the sidewalks within the Contract Limits Lines.

3.21 MAINTENANCE OF PROJECT SITE:

A. The Contractor must take over and maintain all Project areas, after order to start Work.

B. Until the date of Final Acceptance, the Contractor must be responsible for the safety of all Project areas, including water, gas, electric and other mains and pipes and conduits and must, at the Contractor's own expense, except as otherwise specified, protect same and maintain them in at least as good condition as that in which the Contractor finds them.

C. All pavements, sidewalks, roads and approaches to fire hydrants must be kept clear at all times, maintained, and if damaged, repaired to serviceable conditions with materials to match existing.

D. The Contractor must keep the space for the Resident Engineer in a clean condition.

3.22 SAFETY PRECAUTIONS FOR CONTROL CIRCUITS:

A. Control circuits, the failure of which will cause a hazard to life and property, must comply with DOB Bureau of Electrical Control requirements.

3.23 OBSTRUCTIONS IN DRAINAGE LINES:

A. The Contractor must be responsible for all obstructions occurring in all drainage lines, fittings, and fixtures after the installations and cleaning of these drainage lines, fittings, and fixtures, as certified by the Resident Engineer. Roof drains must be kept clear of any and all debris. Any stoppage must be repaired immediately at the expense of the Contractor.

3.24 CORRECTION OF THE WORK

A. Subject to the terms of the Contract, the Contractor must complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Contractor must repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 73 00

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and procedural requirements for the management and disposal ofconstruction waste and includes the following requirements:
   1. Waste Management Goals
   2. Waste Management Plan
   3. Progress Reports
   4. Progress Meetings
   5. Management Plan Implementation

B. This section includes:
   1. Definitions
   2. Waste Management Performance Requirements
   3. Reference Resources
   4. Submittals
   5. Quality Assurance
   6. Waste Plan Implementation
   7. Additional Demolition and Salvage Requirements
   8. Disposal

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
C. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
D. Section 01 73 00 EXECUTION
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS
G. Refer to the Addendum to identify whether this Project is designed to comply with a Certification Level according to the U.S. Green Building Council's LEED Rating System, as specified in Section 01 81 13.03"SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS" or Section 01 81 13.04 "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS".

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the GeneralConditions not otherwise defined herein.

Term	**Definition**
Alternative Daily Cover (ADC)	Material other than earthen material placed on the surface of the active face of a municipal solid Waste landfill at the end of each Work Day to control vectors, fires, odors, blowing litter and scavenging.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Clean	Untreated and unpainted; not contaminated with oils, solvents, caulk or the like.
Construction and Demolition (C&D) Waste	Solid Wastes typically including building materials, trash debris and rubble resulting from remodeling, repair and demolition operations. Hazardous materials and land clearing Waste are not included.
Diversion from Landfill	Material removal from the Site for Recycling, Reuse or Salvage that might otherwise be sent to a landfill.
Off-site Sorting	Material types that are combined on the project site and hauled away for sorting. Measured weights only. Approximations of weight or volume based on visual inspection are not acceptable. a. Off-site Sorting Method 1: Diversion Rate derived from the weight of the individual diverted material type divided by the weight of the commingled waste. Individual diverted material types handled through this sorting method are each counted as an individual diverted material type. b. Off-site Sorting Method 2: Diversion Rate derived from the waste sorting facility average diversion rate, multiplied by the weight of the commingled waste. All diverted materials handled through this sorting method are counted as a single diverted material type.
On-site Sorting	Material types that have been sorted in segregated containers or project areas for removal as segregated diverted material types. Measured weights only. Approximations of weight or volume based on visual inspection are not acceptable. a. On-site Sorting: Diversion Rate derived from the weight of the diverted material type. Material diverted through this sorting method are each counted as an individual diverted material type.
Recyclable	The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product.
Recycle (recycling)	To sort, separate, process, treat or reconstitute solid Waste and other discarded materials for the purpose of redirecting such materials into the manufacture of useful products. Recycling does not include burning, incinerating or thermally destroying Waste.
Return	To give back Reusable items or unused products to vendors.

Reuse	To reuse excess or discarded construction material in some manner on the Project Site.
Salvage	To remove a Waste material from the Project Site for resale or reuse.
Waste	Extra material or material that has reached the end of its useful life in its intended use. Waste includes Salvageable, Returnable, Recyclable and Reusable material.
Waste Management Plan	A Project-related plan for the collection, transportation and disposal of Waste generated at the construction Site. The purpose of the plan is to ultimately reduce the amount of material becoming landfill.
Waste-to-Energy	The conversion of non-Recyclable Waste materials into usable heat, electricity or fuel through a variety of processes, including combustion, gasification, pyrolization, anaerobic digestion and landfill gas recovery.

1.5 WASTE MANAGEMENT PERFORMANCE REQUIREMENTS:

A. The City of New York has established that this Project must generate the least amount of Waste possible and employ processes that ensure the generation of as little Waste as possible due to error, inaccurate planning, breakage, mishandling, contamination, or other factors.

B. Of the Waste that is generated during demolition, as many of the Waste materials as economically feasible, and as stated here, must be Reused, Salvaged, or Recycled. Waste disposal in landfills must be minimized.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.5 C

C. LEED CERTIFICATION: The City of New York will seek Leadership in Energy and Environmental Design (LEED) certification for this Project as indicated in the Addendum to the General Conditions from the U.S. Green Building Council. The documentation required here will be used for this purpose. LEED awards points for a variety of sustainable design measures on a project, one of which is the Reuse and Recycling of project Waste.

D. DIVERSION REQUIREMENTS. With the exception of LEED v4 projects with demolition ADC Waste, a minimum of seventy-five percent (75%) of total Project demolition and construction Waste (by weight) must be diverted from landfill through at least four (4) diverted material types. LEED v4 projects with demolition ADC Waste must divert a minimum of fifty percent (50%) of total Project demolition and construction Waste (by weight) from landfill through at least three (3) diverted material types. The following Waste categories are likely candidates to be included in the diversion plan as applicable for this Project:

1. Concrete;
2. Bricks;
3. Concrete masonry units (CMU);
4. Asphalt;
5. Metals (e.g. banding, stud trim, ceiling grid, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, brass, bronze);
6. Clean dimensional wood;

7. Carpet and pad;
8. Drywall;
9. Ceiling tiles;
10. Cardboard, paper and packaging; and
11. Reuse items indicated on the Contract Drawings and/or elsewhere in the Specification.

E. All fluorescent lamps, High Intensity Discharge lamps and mercury-containing thermostats removed from the Site must be Recycled. Do not use bulb crusher on Site.

F. Recycling on the job, subject to the Commissioner's approval, is encouraged on the Site itself, such as the crushing and reuse of removed sound concrete and stone. Include these categories in the Waste Management Plan.

G. Land-clearing debris is not considered construction, demolition or renovation Waste and is not to be included as contribution to Waste diversion.

H. A minimum of five (5) material types, both structural and nonstructural, are to be identified in the Construction Waste Management Plan for diversion.

I. For LEED v4 projects, material to be used as ADC does not qualify as material diverted from disposal.

1.6 REFERENCES, RESOURCES:

A. DDC encourages its Contractors to seek information from websites and experts in Salvage or Recycling inorder to minimize disposal costs. There are numerous opportunities to sell, Salvage, or to donate materials and accrue tax benefits (which would accrue to the Contractor responsible for removal); there are also outlets that will pick up, and in some cases, buy Recyclable materials. Examples of information resources are as follows:

1. A standard Construction and Demolition (C&D) Waste Management Log form is available through DDC's Sustainable Design website: https://www1.nyc.gov/assets/ddc/downloads/Sustainable/forms-local-law-86/waste-tracking-form.pdf.
2. Web Resources (information only; no warranty or endorsement is implied):
    a. www1.nyc.gov/assets/donate/site/ – Website of donateNYC, a network of nonprofit organizations in New York City that accept and distribute second-hand and surplus goods.
    b. www.bignyc.org – Website of Build It Green NYC, a non-profit outlet for Salvaged and surplus building materials.
    c. www.usgbc.org – Website of the United States Green Building Council, with a description of the LEED certification process and requirements for C&D Waste Recycling.
    d. www.epa.gov/smm/sustainable-management-construction-and-demolition-materials– Website of the U.S. Environmental ProtectionAgency (EPA) that discusses C&D Waste issues, and links to other resources.
3. Waste-to-Energy Facilities that need to comply with European Standard (EN) for Waste management and emissions into air, soil, surface water and groundwater:
    a. www.ec.europa.eu/environment/waste/framework/index.htm – European Commission Waste Framework Directive 2008/98/EC.
    b. https://eur-lex.europa.eu/homepage.html - European Commission Waste

Incineration Directive 2000/76/EC.

c. www.cen.eu/cen/Products – EN Standards 303-1, 303-2, 303-3, 303-4, 303-5, 303-6, 303-7.

1.7 SUBMITTALS:

A. The Contractor must refer to Section 01 33 00 SUBMITTAL PROCEDURES for submittal requirements.

B. The Contractor must be responsible for the development and implementation of a Waste Management Plan for the Project. The Contractor's subcontractors must assist in the development of that Plan, and collect and deposit their Waste and Recyclable materials in accordance with the approved Plan.

C. Draft Waste Management Plan: Within fifteen (15) Days after receipt of the Notice to Proceed (NTP), or prior to any Waste removal, whichever occurs sooner, the Contractor must submit to the Commissioner a Draft Waste Management Plan. Include separate sections for C&D Waste. The Plan must demonstrate how the performance goals will be met, and contain the following:

1. List of material types targeted for Reuse, Salvage, or Recycling, and names, addresses, and phone numbers of receiving facilities/companies that will be purchasing or accepting each material. Each material listed is to include estimated amount in tons and percentage of overall construction waste of each of the material steams.
2. Estimation of the percentage of overall construction waste that will be sent to landfill.
3. Description of on-Site and/or off-Site sorting methods for all materials to be removed from Site. Off-site sorting methods must be categorized as Off-site Sorting Method 1 or Off-site Sorting Method 2.
4. If mixed C&D Waste is to be sorted off-Site, provide a letter from the processor stating the average percentage of mixed C&D Waste they Recycle. Waste processor's average percentage of mixed C&D waste must not include Alternative Daily Cover as a recycled material for LEED v4 projects.
5. Landfill information: Names of landfills where non-Recyclable/reusable/salvageable Waste will be disposed, and list of applicable tipping fees.
6. Material handling procedures: Specify whether materials must be separated or commingled and describe the planned diversion strategies. Describe expected amount of each material type, where materials must be taken and how the Recycling facility must process the material. Provide a description of the means by which any Recyclable, Salvaged, or Reused materials will be protected from contamination and collected in a manner that will meet the requirements for acceptance by the designated Recycling processors.
7. Transportation: A description of the means of transportation and destination for Recycled materials.
8. Meetings: Regular meetings must be held monthly, or as directed by the Commissioner, and the Contractor must provide a description of these meetings to address Waste management.
9. Sample spreadsheet and description of how the implementation of the Plan will be documented and submitted on a monthly basis.

D. Final Waste Management Plan: Within fifteen (15) Days of Commissioner's approval of the Draft Waste Management Plan, the Contractor must submit a Final Waste Management Plan.

E. Progress Reports: The Contractor must submit a monthly Waste Management Progress Report, containing the following information:

1. Project title, name of company completing report, and dates of period covered by the report.
2. Report on the disposal of all Project Site Waste. A DDC C&D Waste Management Log form is included at the end of this section. For each shipment of material removed from the Site, provide the following:
    a. Date and ticket number of removal;
    b. Identity of material hauler;
    c. Material type;
    d. Waste sorting method;
    e. Total quantity of Waste, in tons/cubic yards, by type;
    f. Quantity of Waste Salvaged, Recycled and/or Reused, by type;
    g. Total quantity of Waste diverted from landfill (Recycled, Salvaged, Reused) as a percentage of total Waste; and
    h. Recipient of each material type.
3. Provide monthly and cumulative Project totals of Waste, quantity diverted, and percentage diverted.
4. Note that the unit of measurement may be either tons or cubic yards but must be consistent for all shipments and all materials throughout the Project. Reports with inconsistent or mixed units will not be reviewed and will be Returned for re-submission.
5. Include legible copies of on-Site logs, weight tickets and receipts. Receipts must be from charitable organizations, Recycling and/or disposal site operators who can legally accept the materials for the purpose of reuse, Recycling or disposal. Contractor must save such original documents for the life of the Project plus seven (7) years.

F. LEED Submittal: For LEED-designated projects, submit final LEED construction Waste report signed by the Contractor, tabulating total Waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met. Waste report must include:
    1. At least four (4) material streams for diverted materials;
    2. Documentation of Recycling rates for commingled facilities; and
    3. For Waste-to-Energy strategy, submit documentation of facility adherence to relevant EN standards, and justification for the strategy.

G. Refrigerant Recovery: Where refrigerant is recovered, submit statement of refrigerant recovery, which must include:
    1. Name, address, qualification data and signature of the refrigerant recovery technician responsible for recovering refrigerant;
    2. Statement that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations; and
    3. Date refrigerant was recovered.

1.8 QUALITY ASSURANCE:

A. The Contractor must designate a Construction Waste Management Representative to ensure compliance with this section. The Representative must be present at the Project Site full-time and for the duration of the Project.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Plans, documentation, and implementation must be discussed at the following meetings:

1. Pre-demolition kick-off meeting;
2. Pre-construction kick-off meeting;
3. Regular job-site meetings; and
4. Contractor toolbox meetings.

E. For LEED v4 projects, Waste-to-Energy Facilities: Comply with EN standards for Waste management and emissions into air, soil, surface water, and groundwater.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 WASTE PLAN IMPLEMENTATION:

A. Prior to the demolition and construction start, the Contractor must implement the Waste Management Plan, coordinate the Plan with all affected trades, and designate one individual as the Construction Waste Management Representative. The Representative will be responsible for communicating the progress of the Plan with the Commissioner on a regular basis and for assembling the required LEED documentation.

B. The Contractor must be responsible for the provision of containers and the removal of all Waste, non-Returned surplus materials and rubbish from the Site in accordance with the approved Waste Management Plan. The Contractor must oversee and document the results of the Plan. Monies received for Salvaged materials must remain with the Contractor, except the monies for those items specifically identified elsewhere in the specifications or indicated on the Contract Drawings as belonging to others.

C. Responsibilities of subcontractors: Each subcontractor must be responsible for collecting its Waste, non-Returned surplus materials and rubbish, in accordance with the Waste Management Plan.

D. Distribution: The Contractor must distribute copies of the Waste Management Plan to each subcontractor, Resident Engineer, Construction Manager, and the Commissioner.

E. Instruction: The Contractor must provide on-Site instruction of proper Waste management procedures to be used by all parties at appropriate stages of the Project.

F. Procedures: Conduct Waste management operations to ensure minimum interference with Site vegetation, roads, streets, walkways and other adjacent, occupied, and used facilities. The waste management operations include, but are not limited to:

1. Collect commingled Waste and/or separate all Recyclable Waste in accordance with the Plan. Specific areas on the Project Site are to be designated, and appropriate containers and bins clearly marked with acceptable and unacceptable materials.
2. Inspect containers and bins for contamination and remove contaminated materials if found. Comply with requirements in the following General Conditions sections for controlling dust

and dirt, environmental protection, and noise control: Section 01 81 19 - INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS, Section 01 81 13.03 - SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 - SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS, Section 01 10 00 – SUMMARY, Section 01 35 26 - SAFETY REQUIREMENTS PROCEDURES, Section 01 50 00 - TEMPORARY FACILITIES, SERVICES AND CONTROLS, and Section 01 73 00 – EXECUTION..

3.2 ADDITIONAL DEMOLITION AND SALVAGE REQUIREMENTS:

A. Demolition and Salvage of additional items indicated in other sections of the Project Specifications require special attention as part of the overall seventy-five percent (75%) Diversion from Landfill. Specific requirements for special attention are designated in other sections of the Project Specifications.

3.3 DISPOSAL:

A. General: Except for items or material to be Salvaged, Recycled, or otherwise Reused, remove Waste material from the Project Site and legally dispose of them in a manner acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow Waste materials that are to be disposed of to accumulate on Site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn Waste materials.

C. Disposal: Transport Waste materials off Project Site and legally dispose of them.

END OF SECTION 01 74 19

(No Text on This Page)

Department of Design and Construction

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT LOG

Project Name: _____
Project I.D.: _____

Contractor: _____
Prepared by: _____
For Month: _____

Haul Date	Ticket #	Hauling Company	*Material Type[2]	Sorting Method[5]	Material Quantity (tons or cubic yards)[1] *Total Weight	Excluded Material[3]	*Diverted Material[4]	*Landfilled Material	*Material Recipient
					*Total		*Diverted	*Landfilled	
			Monthly Totals						
			% Diverted this Month*						
			Cumulative Totals						
			% Diverted to Date						

Notes:

1. Volume (cubic yards) may be used instead of weight if used for ALL amounts and ALL materials.
2. Includes concrete; bricks; concrete masonry units (CMU); asphalt; metals; clean dimensional wood; carpet and pad; drywall; ceiling tiles; cardboard, paper, and packaging; and any other Reuse items indicated on the Contract Drawings and/or elsewhere in the Specifications.
3. Excluded material includes soil or land clearing debris and for LEED v4 projects, Alternative Daily Cover (ADC) such as screen fines and 6” minus.
4. Diverted material includes Recycled and Reused material diverted from landfill. Recycled material is reprocessed into new products. Reused material is reclaimed, Salvaged or otherwise used in its original form, either on-site or off-site.
5. Sorting Method must be classified as On-Site Sorted, Off-Site Sorted Method 1, or Off-Site Sorted Method 2.

* These items must be listed in order to receive LEED credit.

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and general procedural requirements for Closeout Procedures, including, without limitation, the following:

1. Definitions
2. Substantial Completion
3. Final Acceptance
4. Warranties
5. Final Cleaning

B. LEED: Refer to the Addendum to identify whether this Project is designed to comply with a Certification Level according to the U.S. Green Building Council's (USGBC) Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

C. COMMISSIONING: Refer to the Addendum to identify whether this Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED- NC procedures, as described in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE. The Contractor must cooperate with the Commissioning Agent and provide whatever assistance is required.

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
D. Section 01 78 39 CONTRACT RECORD DOCUMENTS
E. Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBSTANTIAL COMPLETION:

A. Preliminary Procedures: Before requesting inspection to determine the date of Substantial Completion, the Contractor must complete and supply all items required by the Contract Specifications, General Conditions, Addendum to the General Conditions, change orders or other directives from the Commissioner's representatives. The required items will include all Contract requirements for Substantial Completion, including, but not limited to, items related to releases, regulatory approvals, warranties and guarantees, record documents, testing, demonstration and orientation, final clean up and repairs, and all specific checklist of items by the Resident Engineer. (See Attachment "A" at the end of this section for sample requirements for Substantial Completion).

B. The Contractor must prepare and submit a list to the Resident Engineer of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

C. Inspection: The Contractor must submit to the Resident Engineer a written request for inspection for Substantial Completion. Within ten (10) Days of receipt of the request, the Resident Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. The Resident Engineer may request the services, as required, of the Design Consultant, client agency representative and/or other entities having involvement with the Work to assist in the inspection of the Work. If the Resident Engineer makes a determination that the Work is Substantially Complete and approves the Final Approved Punch List and the date for Final Acceptance, he/she will so advise the Commissioner and recommend issuance of the Certificate of Substantial Completion. If the Resident Engineer determines that the Work is not substantially complete, he/she will notify the Contractor of those items that must be completed or corrected before the Certificate of Substantial Completion will be issued.

1 Re-inspection: Contractor must request re-inspection when the Work identified in previous inspections as incomplete are completed or corrected.
2 Results of completed inspection will form the basis of the requirements for Final Acceptance.

1.6 FINAL ACCEPTANCE:

A. Preliminary Procedures: Before requesting final inspection for Final Acceptance of the Work, the Contractor must complete the following. (Note that the following are to be completed, submitted as appropriate, and approved by the Commissioner, as applicable, prior to the final inspection and are not to be submitted for approval or otherwise at the final inspection unless specifically indicated). List exceptions in the request.

1. Verify that all required submittals have been provided to the Commissioner including, but not limited to, the following:

   a. Manufacturer's cleaning instructions;

   b. Posted instructions;

   c. As-built Contract Documents (Drawings, Specifications, and product data) as described in Section 01 78 39 CONTRACT RECORD DOCUMENTS, incorporating any changes required

by the Commissioner as a result of the review of the submission prior to the pre-final inspection;

d. Operation and maintenance manuals, including preventive maintenance, special tools, repair requirements, parts list, spare parts list, and operating instructions;

e. Completion of required demonstration and orientation, as applicable, of designated personnel in operation and maintenance of systems, sub-systems and equipment;

f. Applicable LEED Building submittals as described in Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS; and

g. Construction progress photographs as described in Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

2. Submit a certified copy of the Final Approved Punch List of items to be completed or corrected. The certified copy of the Punch List must state that each item has been completed or otherwise resolved for acceptance, and must be endorsed and dated by the Contractor.

3. Submit pest-control final inspection report and survey as required in Section 01 50 00 TEMPORARY FACILITIES AND CONTROLS.

4. Submit record documents and similar final record information.

5. Deliver tools and similar items.

6. Complete final clean-up requirements including touch-up painting of marred surfaces.

7. Submit final meter readings for utilities, as applicable, a measured record of stored fuel, and similar data as of the date when the City took possession of and assumed responsibility for corresponding elements of the Work.

B. Final Inspection: The Contractor must submit to the Resident Engineer a written request for inspection for Final Acceptance of the Work. Within ten (10) Days of receipt of the request, the Resident Engineer will either proceed with inspection or notify the Contractor of unfulfilled requirements. The Resident Engineer may request the services, as required, of the Design Consultant, client agency representative and/or other entities having involvement with the Work to assist in the inspection of the Work. If the Resident Engineer finds that all items on the Final Approved Punch List are complete and no further Work remains to be done, he/she will so advise the Commissioner and recommend the issuance of the determination of Final Acceptance. If the Resident Engineer determines that the Work is not complete, he/she will notify the Contractor of those items that must be completed or corrected before the determination of Final Acceptance will be issued.

C. Final Acceptance: The Work will be accepted as final and complete as of the date of the Resident Engineer's inspection if, upon such inspection, the Resident Engineer finds that all items on the Final Approved Punch List are complete and no further Work remains to be done. The Commissioner will then issue a written determination of Final Acceptance.

1.7 WARRANTIES:

A. Schedule B of the Addendum lists the items of materials and/or equipment for which manufacturer warranties are required. For each item of material and/or equipment listed in Schedule B, the Contractor must obtain a written warranty from the manufacturer. Such warranty must provide that the material or equipment is free from defects for the period set forth in Schedule B and will be replaced or repaired within such specified period. The Contractor must deliver all required warranties to the Commissioner.

B. Unless indicated otherwise, warranties are to take effect on the date of Substantial Completion.

C. Submittal Time: Submit written warranties on request of the Commissioner for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

D. Partial Occupancy: Submit properly executed warranties to the Commissioner within fifteen (15) Days of completion of designated portions of the Work that are completed and occupied or used by the City.

E. Organize the warranty documents into an orderly sequence based on the Project Specification Divisions and Section Numbers.

1. Bind warranties in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES"; name and location of Project; Capitol Budget Project Number (FMS ID); and Contractor's and applicable subcontractor's name and address.
3. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation.
4. Provide a typed description of each product or installation being warranted, including the name of the product, and the name, address, and telephone number of the installer.

F. When warranted materials and/or equipment require operation and maintenance manuals, provide additional copies of each required warranty in each required manual. Refer to Section 01 78 39 CONTRACT RECORD DOCUMENTS, for requirements of operation and maintenance manuals.

PART II – PRODUCTS

2.1 MATERIALS:

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART III – EXECUTION

3.1 FINAL CLEANING:

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations, as applicable, before requesting inspection for Final Acceptance of the Work for the entire Project or for a portion of the Project:

a. Clean Project Site, yard, and grounds in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project Site.

e. Remove snow and ice to provide safe access to building.

f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

h. Sweep concrete floors broom clean in unoccupied spaces.

i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Replace parts subject to unusual operating conditions.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

t. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests, as required in Section 01 50 00 TEMPORARY FACILITIES, SERVICES AND CONTROLS. Prepare and submit a pest control report to the Commissioner.

D. Comply with all applicable safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on City's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project Site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 77 00

ATTACHMENT 'A'

The following list is a general sample of Substantial Completion requirements, including, but not limited to:

1. Prepare and submit a list to the Resident Engineer of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
2. Obtain and submit any necessary releases enabling the City unrestricted use of the Project and access to services and utilities.
3. Regulatory Approvals: Submit all required documentation from applicable governing authorities, including, but not limited to, the New York City Department of Buildings (DOB); Department of Transportation (DOT); Department of Environmental Protection (DEP); Fire Department (FDNY); etc. Documentation includes, but is not limited to, the following:
    a. Building permits, applications and sign-offs;
    b. Permits and sign-off for construction fences; sidewalk bridges; scaffolds, cranes and derricks; utilities; etc.;
    c. Certificates of inspections and sign-offs;
    d. Required certificates and use permits; and
    e. Certificate of Occupancy (C.O.), Temporary Certificate of Occupancy (T.C.O.) or Letter of Completion as applicable.
4. Submit specific warranties required by the Specifications, final certifications, and similar documents.
5. Prepare and submit Contract Documents as described in Section 01 78 39, CONTRACT RECORD DOCUMENTS, including but not limited to:
    a. Approved documentation from governing authorities;
    b. As-built record drawings and Specifications; product data; operation and maintenance manuals;
    c. Final Completion construction photographs;
    d. Damage or settlement surveys;
    e. Final property surveys; and
    f. Similar final record information.
    g. The Resident Engineer will review the submission and provide appropriate comments. If comments are significant, the initial submission will be returned to the Contractor for correction and re-submission incorporating the comments prior to the Final Inspection.
6. Record Waste Management Progress Report: Submit Construction & Demolition (C&D) Waste Management logs, with legible copies of weight tickets and receipts required in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
7. If applicable submit LEED letter template in accordance with the requirements of Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

8. Schedule applicable demonstration and orientation required in other sections of the Project Specifications and as described in Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.
9. Deliver tools and similar items to location designated by Resident Engineer. Label with manufacturer's name and model number where applicable.
10. Make final changeover of permanent locks and deliver keys to the Resident Engineer. Advise Commissioner of changeover in security provisions.
11. Complete startup testing of systems as applicable.
12. Submit approved test/adjust/balance records.
13. Terminate and remove temporary facilities from Project Site, along with mockups, construction tools, and similar elements as directed by the Resident Engineer.
14. If applicable, complete Commissioning requirements as defined in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and/ or Section 01 91 15 BUILDING ENCLOSURE COMMISSIONNING REQUIREMENTS.
15. Complete final cleaning requirements, including touchup painting.
16. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

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SECTION 01 78 39
CONTRACT RECORD DOCUMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and general procedural requirements for Contract Record Documents, including:
   1. Contract Record Drawings
   2. Record Specifications, Addenda and Change Orders
   3. Record Product Data
   4. Record Sample Submittal
   5. Construction Record Photographs
   6. Operating and Maintenance Manuals
   7. Final Site Survey
   8. Demonstration and Orientation DVD
   9. Guarantees and Warranties
   10. Waste Disposal Documentation
   11. LEED Materials and Matrix
   12. Miscellaneous Record Submittals

B. The Department of Design and Construction (DDC), at the start of construction (kick-off meeting), will furnish to the Contractor, at no cost, a complete set of Contract Record Drawings (PDF set) pertaining to the Work to be performed under the Contract. It is the responsibility of the Contractor to modify the Contract Drawings to indicate all changes and corrections, if any, occurring in the Work as actually installed. The Contractor is required to furnish all other drawings, if necessary, such as Addenda Drawings and Supplementary Drawings as may be necessary to indicate all Work in detail as actually completed. <u>All professional seals must be blocked out</u>. Title box complete with Project title and Design Consultants' names will remain.

C. Maintenance of Documents and Samples: The Contractor must maintain, during the progress of the Work, an accurate record of the Work as actually installed, on Contract Record Drawings (PDF set). Store Contract Record Documents and samples in the field office apart from the Contract Documents used for construction. Do not use Contract Record Documents for construction purposes. Maintain Contract Record Documents in good order and in a clean, dry, legible condition. Make documents and samples available at all times for the Resident Engineer's inspections.
   1. The Contractor's attention is particularly directed to the necessity of keeping accurate records of all subsurface and concealed Work, so that the Contract Record Drawings contain this information in exact detail and location. Contract Record Drawings must also show all connections, valves, gates, switches, cut-outs and similar operating equipment.

2. For projects designated to achieve a Leadership in Energy and Environmental Design (LEED) rating, the Contractor will receive a copy of the Project's LEED scorecard for the purpose of monitoring compliance with the target objectives and to facilitate coordination with the LEED Consultant. The Contractor will receive periodic updates of this scorecard and is required to submit the final version of the Scorecard at Substantial Completion with other Project Record Documents.

1.3 RELATED SECTIONS: include without limitation the following:

A.	Section 01 10 00	SUMMARY
B.	Section 01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
C.	Section 01 32 33	PHOTOGRAPHIC DOCUMENTATION
D.	Section 01 33 00	SUBMITTAL PROCEDURES
E.	Section 01 77 00	PROJECT CLOSEOUT PROCEDURES

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Commissioning Authority / Commissioning Agent (CxA)	The entity responsible for providing commissioning services for the Project. The entity serving as the CxA may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
LEED Consultant	The entity responsible for providing LEED sustainability services for the Project. The entity serving as the LEED Consultant may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBMITTALS:

A. As-Built Contract Record Drawings: The Contractor must comply with the following:

1. Progress Submission: As directed by the Resident Engineer, submit progress as-built Contract Record Drawings at the fifty percent (50%) construction completion stage.

2. Final Submission: Before Substantial Completion payment, the Contractor must furnish to the Commissioner one (1) complete set of marked-up as-built Contract Record Drawings, in PDF indicating all of the Work and locations as actually installed.

3. As-built Contract Record Drawings must be of the same size as that of the Contract Drawings, with a one (1) inch margin on three (3) sides and a two (2) inch margin on the left side for binding.

4. Each as-built Contract Record Drawing must bear the legend "AS-BUILT CONTRACT RECORD DRAWING" in heavy block lettering, one half (l/2) inch high, and contain the following data:

AS-BUILT CONTRACT RECORD DRAWING

Contractor's Name		_____
Contractor's Address		_____
Subcontractor's Name (where applicable)		_____
Subcontractor's Address		_____
Made by:	Date	_____
Checked by:	Date	_____

Commissioner's Representatives	
(Resident Engineer)	DDC
(Plumbing Inspector)	DDC
(Heating & Ventilating Inspector)	DDC
(Electrical Inspector)	DDC

5. Contract Record Drawing Title Sheet: The Contractor must prepare a title sheet, the same size as the Contract Record Drawings, which must contain the following:

   a. Heading:
      The City of New York
      Department of Design and Construction
      Division of Public Buildings
   b. Capital Budget Project Number (FMS ID)
   c. Name and Location of Project
   d. Contractor's Name and Address
   e. Subcontractor's Name and Address (where applicable)
   f. Record of changes (a caption description of work affected, and the date and number of change order or other authorization)
   g. List of Record Drawings

B. Record Specifications, Addenda and Change Order: Submit to the Commissioner two (2) copies each of marked-up Record Specifications, Addenda and change orders.

C. Record Product Data: Submit to the Commissioner two (2) sets of Record Product Data.

D. Record Construction Photographs: Submit to the Commissioner final as-built construction photographs and digital files of the completed Work as described in Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

E. Operating and Maintenance Manuals:

1. Submit three (3) copies each of preliminary manuals to the Resident Engineer for review and approval. The Contractor must make such corrections, changes and/or additions to the manual until deemed satisfactory by the Resident Engineer. Deliver three (3) copies of the final approved manuals to the Resident Engineer for distribution.

2. Commissioning: Comply with the requirements of Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE, as well as the requirements set forth in sections of the Project Specifications, for projects designated for commissioning. Submit four (4) copies each of data designated to be included in the commissioning operation and maintenance manual to the Resident Engineer. The Resident Engineer will forward such data to the Commissioning Authority/Agent (CxA) for review and comment. The Contractor must make such corrections, changes and/or additions to the data until deemed satisfactory and deliver four (4) copies of the final data to the Resident Engineer for use by the CxA to prepare the commissioning operation and maintenance manual.

a. Non-Commissioning Data: All remaining data not designated for commissioning and required as part of maintenance and operation manual must be prepared and assembled in accordance with the requirements of this section for operating and maintenance manuals.

F. Final Site Survey: Submit Final Site survey as described in Section 01 73 00, EXECUTION, in quantities requested by the Commissioner, signed and sealed by a Land Surveyor licensed in the State of New York.

G. Guarantees and Warranties.

H. Waste Disposal Documents and Miscellaneous Record Documents.

PART II – PRODUCTS

2.1 CONTRACT RECORD DRAWINGS:

A. Record Prints: The Contractor must maintain one (1) set of blue- or black-line white prints as applicable of the Contract Record Drawings and Shop Drawings. If applicable, the Contract Record Drawings and Shop Drawings must incorporate the arrangement of the Work based on the accepted master coordination drawing(s) as described in Section 01 33 00, SUBMITTAL PROCEDURES.

1. Preparation: The Contractor must mark record drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Change Orders: All changes from Contract Drawings must be distinctly encircled and identified by change order number correlating to changes listed on the "Title Sheet." The Contractor must show within the encircled areas the work as actually installed.

B. Content: Types of items requiring marking include, but are not limited to, the following:

1. Dimensional changes to Contract Record Drawings;
2. Revisions to details shown on Contract Record Drawings;
3. Depths of foundations below first floor;
4. Locations and depths of underground utilities;
5. Revisions to routing of piping and conduits;
6. Revisions to electrical circuitry;
7. Actual equipment locations;
8. Duct size and routing;
9. Locations of concealed internal utilities;
10. Changes made by change order;
11. Changes made following Commissioner’s written orders;
12. Details not on the original Contract Drawings;
13. Field records for variable and concealed conditions; and
14. Record information on the Work that is shown only schematically.

C. Progress Record Prints: As directed by the Resident Engineer, at fifty percent (50%) construction completion, review marked-up Record Prints with the Resident Engineer and the Design Consultant. When directed by the Resident Engineer, transfer progress mark-ups to a PDF set and submit to the Resident Engineer.

D. Final Contract Record Prints: Immediately before final inspection for the Certificate of Substantial Completion, review marked-up record prints with the Resident Engineer and the Design Consultant. When authorized, complete mark-up of a full set of corrected PDF prints of the Contract Drawings.

1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
2. Refer instances of uncertainty to Resident Engineer for resolution.
3. Submit the as-built Contract Record Drawings and Shop Drawings for use as record prints as described in Sub-Section 1.5.

2.2 RECORD SPECIFICATIONS, ADDENDA AND CHANGE ORDERS:

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, Addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record product data has been submitted in operation and maintenance manuals instead of submitted as record product data.
5. Note related change orders and Contract Record Drawings where applicable.
6. Upon completion of mark-up, submit two (2) complete copies of the marked-up record Specifications to the Commissioner.

2.3 RECORD PRODUCT DATA:

A. Preparation: Mark product data to indicate the actual product installation where installation varies substantially from that indicated in product data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project Site and changes in manufacturer's written instructions for installation.
3. If possible, a change order proposal should include resubmitting updated product data. This eliminates the need to mark up the previous submittal.
4. Note related change orders and Contract Record Drawings where applicable.
5. Upon completion of mark-up, submit to the Commissioner two (2) sets of the marked-up record product data.
6. Where record product data is required as part of maintenance manuals, submit marked-up product data as an insert in the manual instead of submittal as record product data.

2.4 RECORD SAMPLE SUBMITTAL:

A. Prior to the date of Substantial Completion, the Contractor must meet with the Resident Engineer at the Site to determine which of the samples maintained during the construction period must be transmitted to the Commissioner for record purposes.

B. Comply with the Resident Engineer's instructions for packaging, identification marking, and delivery to DDC. Dispose of other samples as specified for disposal of surplus and waste material.

2.5 CONSTRUCTION RECORD PHOTOGRAPHS:

A. The Contractor must submit the final completion construction photographs, in compliance with Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

2.6 OPERATING AND MAINTENANCE MANUALS:

A. The Contractor must provide preliminary and final versions of operating and maintenance manuals required for those systems, equipment, and materials listed in other Sections of the Project Specifications.

B. Format: Prepare and assemble operation and maintenance manuals in heavy-duty, 3-ring, hardback loose leaf binders in the form of an instructional manual. All binders for each discipline must be the same color. When multiple binders are used, correlate data into related consistent groupings. Binder front must contain permanently attached labels displaying the following:

1. Heading:
   The City of New York
   Department of Design and Construction
   Division of Public Buildings
2. Capital Budget Project Number (FMS ID)
3. Name and Location of Project
4. Contractor's Name and Address
5. Subcontractor's Name and Address (where applicable)
6. Dates of the Work covered by the contents of the Project Manual.
7. Binder spine must display Project Number (FMS ID) and date of completion.

C. Organization: Include a section in the directory for each of the following:

1. List of documents
2. List of systems
3. List of equipment
4. Table of contents

D. Each manual must contain the following materials, in the order listed:

1. Title page
2. Table of contents
3. Manual contents

E. Arrange contents alphabetically by system, subsystem, and equipment. Cross-reference Specification Section numbers. Provide tabbed flyleaf for each separate product, equipment and/or system/subsystem with typed description of product and major component parts of equipment.

F. Safety warnings or cautions must be visibly highlighted within each maintenance procedure. Use of such highlights must be limited to only critical items and must not be used in an excessive manner which would reduce their effectiveness.

G. For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts. Vendors and supplier listings are to include names, addresses and telephone numbers, including nearest field service telephone numbers.

H. Where contents of the manual include any manufacturer's catalog pages, clearly indicate the precise items and options included in the installation and delete all manufacturers' data regarding products not included in the installation.

I. All material within manuals must be new. Copies used for prior submittals or used in construction must not be used.

J. Submit preliminary and final manual editions to the Commissioner according to the approved progress schedule.

K. Manuals must present all technical material to the greatest extent possible, with respect to text, tabular matter and illustrations. Illustrations must preferably consist of line drawings. All applicable drawings must be included. If available, color photograph prints may be included.

L. Preliminary manual editions must be as technically complete as the final manual edition. All illustrations must be in final forms.

M. Final manual editions must be technically accurate and complete and must represent all "as-built" systems, pieces of equipment, or materials, which have been accepted by the Commissioner. All illustrations, text and tabular material must be in final form. All shop drawings must be included as specified in individual Specification Sections.

N. Building products, applied materials, and finishes: Include product data, with catalog number, size, composition, and color texture designations. Where applicable, provide information for re-ordering custom manufactured products.

O. Instructions for care and maintenance: Include manufacturers' recommendations for cleaning agents and methods, and recommended schedule for cleaning and maintenance.

P. Moisture protection and weather exposed products: Include product data listing applicable reference standards, chemical compositions, and details of installation. Provide recommendations for inspections, maintenance, and repair.

Q. Additional requirements: Specified in individual Specification Sections.

2.7 FINAL SITE SURVEY

A. The Contractor must submit the final certification and final survey in compliance with Section 01 73 00 EXECUTION.

2.8 DEMONSTRATION AND ORIENTATION DVD:

A. The Contractor must submit a final version of applicable demonstration and training electronic recordings in compliance with Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.

2.9 GUARANTEES AND WARRANTIES:

B. SCHEDULE B: Requirements for guarantees and warranties for the Project are set forth in Schedule B, which is included as part of the Addendum.

C. FORM: For all guaranty requirements set forth in Schedule B, the Contractor must provide a written guaranty, in the form set forth herein.

D. Submit fully executed and signed manufacturers' warranties as listed in the Project Specifications and outlined in Schedule B of the Addendum. Refer to Section 01 77 00, CLOSEOUT PROCEDURES for submittal requirements.

GUARANTY

DDC PROJECT # _____

PROJECT DESCRIPTION _____

_____

CONTRACT # _____

SPECIFICATION SECTION # AND TITLE _____

_____

GUARANTY TO BE IN EFFECT FROM _____

TO _____

The Contractor hereby guarantees that the Work specified under the above section of the aforesaid Contract will be free from defects of material and/or workmanship, for the period indicated above.

The Contractor also guarantees that it will promptly repair, restore, rebuild or replace whichever may be deemed necessary by the City, any or all defective material or workmanship of the aforementioned section, that may appear within the guaranty period and any finished Work to which damage may occur because of such defects, to the satisfaction of the City and without any cost or expense to the City.

The Contractor hereby agrees to pay to the City the cost of the repairs or replacements should the City make the same because of the failure of the Contractor to do so.

Contractor: _____

By: _____
Signature of Partner or Corporate Officer

Print Name: _____

Subscribed and sworn to before me this
day of _____ , year _____

_____
Notary Public

2.10 WASTE DISPOSAL DOCUMENTATION:

A. Certify and deliver to the Commissioner all documentation including reports, receipts, certificates, records etc. for the collection, handling, storage, classification, testing, transportation, recycling and/or disposal of all Non-Hazardous Construction Waste as required by Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL, and Hazardous Waste as required by other Project Specification Sections. Certify compliance with all applicable governing laws, codes, rules and regulations.

2.11 MISCELLANEOUS RECORD DOCUMENTS:

A. Refer to other Project Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Prior to Final Acceptance, complete miscellaneous records and place in good order, properly identified and bound or otherwise organized to allow for use and reference.

B. Submit three (3) copies of each document to the Commissioner or as otherwise directed by the Commissioner.

PART III – EXECUTION

3.1 RECORDING AND MAINTENANCE:

A. Recording: Maintain one (1) copy of each submittal during the construction period for Contract Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of the Project.

B. Maintenance of Record Documents and Samples: Store Contract Record Documents and samples in the field office apart from the Contract Documents used for construction. Do not use Contract Record Documents for construction purposes. Maintain Contract Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to the Contract Record Documents for the Resident Engineer's reference during normal working hours.

END OF SECTION 01 78 39

(No Text on This Page)

SECTION 01 79 00
DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 79 00

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and procedural requirements, when set forth in sections of the Project Specifications, for instructing the facility's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Owner's pre-acceptance orientation in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and orientation video recordings.

B. The Contractor must provide the services of orientation specialists from the Contractor's equipment manufacturers. The specialists must be experienced in the type of equipment to be demonstrated.

C. Separate orientation sessions must be conducted for mechanical operations and maintenance personnel and for electronic and electrical maintenance personnel.

D. Commissioning: Refer to the Addendum to identify whether this project is to be commissioned. For commissioned projects, the Contractor must provide demonstration and orientation as described in this section and cooperate with the Commissioning Authority/Agent (CxA) to implement commissioning requirements as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS, and/ or Section 01 91 15 BUILDING ENCLOSURE COMMISSIONNING REQUIREMENTS.

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 77 00 CLOSEOUT PROCEDURES
D. Section 01 78 39 CONTRACT RECORD DOCUMENTS
E. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS
F. Section 01 91 15 BUILDING ENCLOSURE COMMISSIONNING REQUIREMENTS
G. Specific requirements for demonstration and orientation indicated in other sections of the Project Specifications.

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Commissioning Authority / Commissioning Agent (CxA)	The entity responsible for providing commissioning services for the Project. The entity serving as the CxA may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBMITTALS:

A. Instruction Program: Submit three (3) copies of an outline of the instructional program for demonstration and orientation, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each orientation module to the Commissioner for approval no less than thirty (30) Days prior to the date the proposed orientation is to take place. Include learning objectives and outline for each orientation module.

1. At completion of orientation, submit three (3) complete training manual(s) and three (3) applicable video recording(s) to the Commissioner for the facility's and City's use.

B. Qualification Data: For facilitator, instructor and videographer.

C. Attendance Record: For each orientation module, submit a list of participants and length of instruction time.

D. Evaluations: For each participant and for each orientation module, submit results and documentation of performance-based test.

E. Submit all final orientation materials to the Resident Engineer a minimum of fourteen (14) Days prior to the scheduled orientation.

F. Demonstration and Orientation Recordings:

1. All Projects:

a. The Contractor must submit to the Commissioner three (3) copies of demonstration and orientation video recordings within seven (7) Days of end of each orientation module.

b. Identification: On each copy, provide an applied label with the following information:

1) Project Contract I.D. Number
2) Project Contract Name
3) Name of Contractor
4) Name of Subcontractor as applicable
5) Name of Design Consultant
6) Name of Construction Manager as applicable
7) Date recorded

8) Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
9) Table of Contents including list of systems covered.

c. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding DVD recording. Include name of Project and date of recording on each page.

d. Commissioned Projects: The Contractor must submit one (1) additional copy of the demonstration and orientation video recording to the CxA through the Resident Engineer who will include the approved recording in the commissioning report.

1.6 QUALITY ASSURANCE:

A. Facilitator Qualifications: A firm or individual experienced in orientation or educating maintenance personnel in an orientation program similar in content and extent to that indicated for this Project.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 QUALITY REQUIREMENTS, experienced in operation and maintenance procedures and orientation.

C. Videographer Qualifications: A professional videographer who has experience with orientation and construction projects.

D. Pre-Instruction Conference: Schedule with the Resident Engineer a conference at Project Site in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION. Review methods and procedures related to demonstration and orientation including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.7 COORDINATION:

A. Coordinate instruction schedule with the Resident Engineer and facility’s operations. Adjust schedule as required to minimize disrupting facility’s operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of orientation modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the Commissioner.

PART II – PRODUCTS

2.1 INSTRUCTION PROGRAM:

A. Program Structure: Develop an instruction program that includes individual orientation modules for each system and equipment not part of a system, as specified and required by individual Specification Sections.

B. Orientation Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. For basis of system design, operational requirements, and criteria, include the following:
   a. System, subsystem, and equipment descriptions;
   b. Performance and design criteria if Contractor is delegated design responsibility;
   c. Operating standards;
   d. Regulatory requirements;
   e. Equipment function including auxiliary equipment and systems;
   f. Operating characteristics;
   g. Limiting conditions; and
   h. Performance curves.

2. For documentation, review the following items in detail:
   a. Emergency manuals;
   b. Operations manuals;
   c. Maintenance manuals;
   d. Project Record Documents;
   e. Identification systems; and
   f. Warranties.

3. For emergencies, include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages;
   b. Instructions on stopping;
   c. Shutdown instructions for each type of emergency;
   d. Operating instructions for conditions outside of normal operating limits;
   e. Sequences for electric or electronic systems; and
   f. Special operating instructions and procedures.

4. For operations, include the following, as applicable:
   a. Startup procedures;
   b. Equipment or system break-in procedures;
   c. Routine and normal operating instructions;
   d. Regulation and control procedures;
   e. Control sequences;
   f. Safety procedures;
   g. Instructions on stopping;
   h. Normal shutdown instructions;
   i. Operating procedures for emergencies;
   j. Operating procedures for system, subsystem, or equipment failure;
   k. Seasonal and weekend operating instructions;
   l. Required sequences for electric or electronic systems; and
   m. Special operating instructions and procedures.

5. For adjustments, include the following:
   a. Alignments;
   b. Checking adjustments;
   c. Noise and vibration adjustments; and
   d. Economy and efficiency adjustments.

6. For troubleshooting, include the following:

a. Diagnostic instructions; and
b. Test and inspection procedures.

7. For maintenance, include the following:
   a. Inspection procedures;
   b. Types of cleaning agents to be used and methods of cleaning;
   c. List of cleaning agents and methods of cleaning detrimental to product;
   d. Procedures for routine cleaning;
   e. Procedures for preventive maintenance;
   f. Procedures for routine maintenance;
   g. Instruction on use of special tools; and
   h. Housekeeping practices.

8. For repairs, include the following:
   a. Diagnosis instructions;
   b. Repair instructions;
   c. Disassembly, component removal, repair, and replacement; and reassembly instructions;
   d. Instructions for identifying parts and components; and
   e. Review of spare parts needed for operation and maintenance.

PART III – EXECUTION

3.1 INSTRUCTION:

A. Facilitator: Engage a qualified facilitator to prepare the instruction program and orientation modules, to coordinate instructors, and to coordinate between Contractor and the Resident Engineer for the number of participants, instruction times, and location.

B. The Contractor must engage qualified instructors to instruct the facility's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Schedule instruction with the Resident Engineer at mutually agreed upon times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.

   1. Schedule orientation with the Resident Engineer with at least fourteen (14) Days advance notice.

D. Evaluation: At the conclusion of each orientation module, assess and document each participant's mastery of module(s) by use of an oral or written demonstration performance-based test.

E. Cleanup: Collect and remove used and leftover educational materials from Project Site. Remove instructional equipment. Restore systems and equipment to condition existing before initial orientation use.

3.2 DEMONSTRATION AND ORIENTATION VIDEO RECORDINGS:

A. All projects:

   1. The Contractor must engage a qualified commercial videographer to video record demonstration and orientation sessions. Record each orientation module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

   2. At the beginning of each orientation module, record each chart containing learning objective and lesson outline.

   3. All recordings must be close-captioned.

   4. Recording Format: Provide high-quality video recording on USB drive or other electronic media as requested by the Commissioner.

5. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and orientation. Display continuous running time.

6. Narration: Describe scenes on the recording by audio narration by microphone while recording or by dubbing audio narration off-site after. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

7. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from opposite the corresponding narration segment.

B. Commissioned Projects: Refer to the Addendum to determine if the project is to be commissioned.

1. The Commissioning Authority/Agent (CxA) under separate contract with the City of New York will assess and comment on the adequacy of the orientation instruction sessions by reviewing the orientation and instruction program and agenda provided by the Contractor. The provider of the orientation program will video record the sessions and provide a copy to the CxA for final review and comments. If necessary, Contractor must edit the recording per CxA comments.

END OF SECTION 01 79 00

SECTION 01 81 13.03
SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13.03

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. LEED BUILDING - GENERAL REQUIREMENTS**:**

The City of New York is committed to implementing good environmental practices and procedures which include achieving a LEED™ Green Building rating. Specific project requirements related to this goal are listed in the applicable paragraphs of this section of the General Conditions. The Contractor must ensure that these requirements, as defined in the sections below and in related sections of the Contract Documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, will not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. This Section includes:

1. Definitions
2. LEED Provisions
3. LEED Building Submittals
4. LEED Building Submittal Requirements
5. LEED Action Plan

1.3 RELATED SECTIONS: Include without limitation the following:

A.	Section 01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
B.	Section 01 81 13.13	VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS FOR LEED v3 BUILDINGS
C.	Section 01 81 19	INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS
D.	Section 01 91 13	GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS
E.	Section 01 91 15	GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Agrifiber Products	Means products derived from recovered agricultural waste fiber from sources such as cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks, and agricultural prunings, processed and mixed with resins to produce panels with characteristics similar to composite wood.
Composite Wood	Means products composed of wood or plant particles or fibers bonded by a synthetic resin or binder to produce panels such as plywood, particleboard, and medium density fiberboard (MDF). Does not include hardboard, structural panels, glued laminated timber, prefabricated wood I-joists, or finger-jointed lumber.
Design Consultant	Means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Forest Stewardship Council (FSC) Certified Wood	Means wood-based materials and products certified in accordance with the Forest Stewardship Council's principles and criteria.
LEED	Means the Leadership in Energy & Environmental Design rating system developed by the United States Green Building Council.
Rapidly Renewable Materials	Means materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.
Regionally Manufactured Materials	Means materials that are manufactured within a radius of 500 miles from the Project location. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.
Regionally Extracted, Harvested, or Recovered Materials	Means materials which are extracted, harvested, or recovered and manufactured within a radius of 500 miles from the Project site.
Recycled Content	Means The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer). Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials. "Pre-consumer" may also be referred to as "post-industrial".
Solar Reflectance Index (SRI)	A measure of a material's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is equal to 0, and a standard white (reflectance 0.80, emittance of 0.90) is equal to 100.

Volatile Organic Compound (VOC)	Any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate) which vaporizes (becomes a gas) and participates in atmospheric photochemical reactions, as specified in Part 51.00 of Chapter 40 of the U.S. Code of Federal Regulations, at normal room temperatures. For the purposes of this specification, formaldehyde and acetaldehyde are considered to be VOCs.

1.5 LEED PROVISIONS:

A. Refer to the Addendum for the LEED rating to be achieved for this project. The provisions to achieve this LEED rating are integrated within the project construction documents and specifications. The Contractor is specifically directed to the "LEED BUILDING Performance Criteria" and "LEED BUILDING Submittals" sections within the contract specification. Additional LEED requirements are met through aspects of the project design, including material and equipment selections, which may not be specifically identified as LEED BUILDING requirements. Compliance with the requirements needed to obtain LEED prerequisites and credits will be used as one criterion to evaluate substitution requests.

1.**6 LEED BUILDING SUBMITTALS:**

A. Scope: LEED BUILDING submittals are required for all installed materials included in General Construction work. LEED BUILDING Submittals are only required for field-applied adhesives, sealants, paints and coatings included in Plumbing, Mechanical and Electrical work. Submit all required LEED BUILDING submittals in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

B. Applicability: The extent of the LEED BUILDING Submittals varies depending on the specification section. Applicable LEED BUILDING Submittals are listed under the "LEED BUILDING Submittals" heading in each specification section. The detailed requirements for the LEED BUILDING Submittals are defined in Item C below.

C. Detailed Requirements: Sub-Sections 1.6 C.1through 1.6 C.3 below defines the information and documents to be provided for each type of LEED BUILDING Submittal as identified in the LEED Submittal Requirements of each specification section:

1. ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM (EBMCF)[GHI]: Information to be supplied for this form (blank sample copy attached at end of this Section to be modified as appropriate to the project) must include some or all of the following items, as identified in the LEED Submittal Requirements of each specification section:

   a. Cost breakdowns for the materials included in the contractor or sub-contractor's scope of work. Cost reporting must include itemized material costs (excluding the contractor's labor, equipment, overhead and profit).

   b. The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).

      1) For each product with recycled content, also indicate the total recycled content value (1/2 x pre-consumer percentage x product value + 1 x post-consumer percentage x product value = total recycled content value).
      2) See additional requirements for concrete below.

   c. Identification (Yes/No) of materials manufactured within 500 miles of the project site AND containing raw materials harvested or extracted within 500 miles of the project site.

      1) Indicate the percentage by weight, relative to the total weight of the product that meets these criteria.
      2) Indicate the point of harvest/extraction/recovery of regional raw materials, the point of final assembly of regional manufactured products, and the distance from each point to the project site.

d. Volatile Organic Compound (VOC) content of all field-applied adhesives, sealants, paints, and coatings, listed in grams/liter or lbs./gallon, less water.

1) For detailed requirements refer to Section 01 81 13.13 VOC LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS.

e. The amount of “Forest Stewardship Council (FSC) Certified” wood products if used in the Project.

1) Record only new FSC-certified wood products. Do not record reclaimed, salvaged, or recycled FSC-certified wood products.
2) Reclaimed, salvaged, or recycled FSC-certified wood may be recorded as post-consumer recycled content.

f. The amount of Rapidly Renewable materials if used in the Project.

1) Indicate the type of rapidly renewable material used, and the percentage by weight, relative to the total weight of the product, that consists of rapidly renewable material.

g. The percentage (by weight), relative to the total weight of cementitious materials, of supplementary cementitious materials or pozzolans such as fly ash used in each concrete mix used in the Project.

1) For each concrete mix, provide a complete breakdown of all components, by weight and by cost.

h. Identification (Yes/No) of composite wood or agrifiber products used in the project that are free of added urea-added formaldehyde resins.

i. Identification (Yes/No) of flooring products used in the project that have Carpet and Rug Institute (CRI) Green Label or Green Label Plus certification, or Resilient Floor Covering Institute FloorScore certification.

1) Untreated solid wood flooring, and mineral-based flooring products such as tile, masonry, terrazzo, and cut stone that have no organic-based coatings or sealants, are excluded from this requirement.

j. The EBMCF must record the above information only for those materials or products permanently installed in the project. The EBMCF must record VOC content, composite and agrifiber products, and CRI or FloorScore ratings only for those materials or products permanently installed within the weather barrier of the LEED building.

2. EBMCF BACK-UP DOCUMENTATION: These documents are used to validate the information provided on the EBMCF (except cost data). For each material listed on the EBMCF, provide documentation to certify the material’s LEED BUILDING attributes, as applicable:

a. RECYCLED CONTENT: Provide published product literature or letter of certification on the manufacturer’s letterhead certifying the amounts of post-consumer and/or post-industrial content.

b. REGIONAL MANUFACTURING AND REGIONAL RAW MATERIALS (WITHIN 500 MILES): Provide published product literature or letter of certification on the manufacturer’s letterhead indicating the city/state where the manufacturing plant is located, where each of the raw materials in the product were extracted, harvested or recovered and the distance in miles from the project site.

1) If only some of the raw materials for a particular product or assembly originate within 500 miles of the project site, provide the percentage (by weight) that these materials comprise in the complete product.

c. VOC CONTENT: Provide Material Safety Data Sheets (MSDS) certifying the Volatile Organic Compound (VOC) content of the adhesive, sealant, paint, or coating products. VOC content is to be reported in grams/liter or lbs./gallon, less water. If the MSDS does not show the product's VOC content, this information must be provided through other published product literature from the manufacturer, or stated in a letter of certification from the product manufacturer on the manufacturer's letterhead.

d. RAPIDLY RENEWABLE MATERIALS: If used in the project, provide published literature or letter of certification on the manufacturer's letterhead certifying the percentage of each product that is rapidly renewable (by weight).

3. PRODUCT CUT SHEETS: Provide product cut sheets with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project.

4. CRI GREEN LABEL PLUS CERTIFICATION: For carpets and carpet cushions, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the products comply with the "Green Label Plus" IAQ testing program of the Carpet and Rug Institute of Dalton, GA.

5. CERTIFICATION OF COMPOSITE WOOD OR AGRIFIBER RESINS: For all composite wood, engineered wood and agrifiber products (including plywood, particleboard, and medium density fiberboard), provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that that the products do not contain added urea-formaldehyde resins.

6. CERTIFICATION OF COMPOSITE WOOD OR AGRIFIBER LAMINATING ADHESIVES: For all laminating adhesives used with composite wood, engineered wood and agrifiber products (e.g., adhesives used to laminate wood veneers to an engineered wood substrate), provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the adhesive products do not contain urea-formaldehyde.

7. FSC-CERTIFIED WOOD:

   a. If used in the project, provide chain of custody documents and copies of invoices regarding wood products, including whether or not such wood product is FSC-certified.

   b. If used in the project, for assemblies, provide the percentage (by cost and by weight) of the assembly that is FSC-certified wood.

   c. If used in the project, for assemblies, provide published product literature or letter from the manufacturer(on the manufacturer's letterhead) verifying the percentage that is FSC-certified wood.

8. GREEN SEAL COMPLIANCE: Provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the following product types comply with the VOC limits and chemical component restrictions developed by the Green Seal organization of Washington, DC:

   a. Interior Architectural Paints and Coatings: refer to Green Seal standard GS-11 (1st edition, May 1993)

   b. Anti-corrosive and Anti-rust paints: refer to Green Seal standard GC-03 (2nd Edition, January 1997)

   c. Aerosol Adhesives: refer to Green Seal standard GS-36 (1st edition, October 2000)

9. HIGH ALBEDO PAVING AND WALKWAY MATERIALS: For paving and walkway materials made from concrete or brick provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying a minimum Solar Reflectance Index (SRI) value of 29. SRI

values will be calculated according to ASTM E 1980. Reflectance will be measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance will be measured according to ASTM E 408 or ASTM C 1371.

10. HIGH ALBEDO ROOFING MATERIALS: For exposed roofing membranes, pavers, and ballast products, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the following minimum Solar Reflectance Index (SRI) values:

    a. 78 for low-sloped roofing applications (slope ≤ 2:12)

    b. 29 for steep-sloped roofing applications (slope > 2:12)

    SRI values will be calculated according to ASTM E 1980. Reflectance will be measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance will be measured according to ASTM E 408 or ASTM C 1371.

    Vegetated roof surfaces are exempt from the SRI criteria.

11. LOW MERCURY LAMPS: For all fluorescent, compact fluorescent, and HID lamps installed in the project, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying:

    a. The mercury content or content range per lamp in milligrams or picograms;

    b. The design light output per lamp (light at 40% of a lamp’s useful life) in lumens; and

    c. The rated average life of the lamp in hours.

    In addition, provide the total number of each lamp type installed in the project.

12. FLOORSCORE CERTIFICATION: For all hard surface flooring, including vinyl, linoleum, laminate flooring, wood flooring, ceramic flooring, rubber flooring, and wall base, provide published product literature or letter from the manufacturer (on the manufacturer’s letterhead) verifying that the products comply with the current FloorScore standard requirements.

13. CONCRETE: Provide concrete mix design for each mix, designated by a distinct identifying code or number and signed by a Professional Engineer licensed in the state in which the concrete manufacturer or supplier is located.

14. INTERIOR LIGHTING FIXTURES: For each lighting fixture type installed within the building’s weather barrier, provide manufacturer’s cut sheets indicating the following:

    a. Fixture power in watts.

    b. Initial lamp lumens.

    c. Photometric distribution data.

    d. Dimming capability, in range of percentages.

15. EXTERIOR LIGHTING FIXTURES: For each lighting fixture type installed on site, provide manufacturer’s cut sheets indicating the following:

    a. Fixture power in watts.

    b. Initial lamp lumens.

    c. Photometric distribution data.

    d. Range of field adjustability, if any.

    e. Warranty of suitability for exterior use.

16. ALTERNATIVE TRANSPORTATION: Provide manufacturer's cut sheets and/or shop drawings for the following items installed on site:
    a. Bike racks, including total number of bicycle slots provided.
    b. Signage indicating parking spaces reserved for electric or low-emitting vehicles and for carpools/vanpools, including total number of signs.
17. WATER CONSERVING FIXTURES: For all water consuming plumbing fixtures and fittings, provide manufacturer's cut sheets showing maximum flow rates and/or flush rates.
18. ENERGY SAVING APPLIANCES: Provide manufacturer's cut sheets and published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the product's rating under the U.S. EPA/DOE Energy Star program, for all of the following:
    a. Appliances (i.e., refrigerators, dishwashers, microwave ovens, televisions, clothes washers, clothes dryers, chilled water dispensers).
    b. Office equipment (i.e., copy machines, fax machines, plotters/printers, scanners, binding and publishing equipment).
    c. Electronics (i.e., servers, desktop computers, computer monitor displays, laptop computers, network equipment).
    d. Commercial food service equipment
19. GLAZING: For glazing in any windows, doors, storefront and window wall systems, curtainwall systems, skylights, and partitions, provide manufacturer's cut sheets indicating the following:
    a. Glazed area.
    b. Visible light transmittance.
    c. Solar heat gain coefficient.
    d. Fenestration assembly u-factor.
20. VENTILATION: Provide manufacturer's cut sheets for the following:
    a. Carbon dioxide monitoring systems, if any, installed to measure outside air delivery.
    b. Air filters: for detailed requirements refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS.
21. REFRIGERATION: For all refrigeration equipment, provide manufacturer's cut sheets indicating the following:
    a. Equipment type.
    b. Equipment life. Default values specified by the 2007 ASHRAE Applications Handbook will be used unless otherwise demonstrated by the manufacturer's guarantee and an equivalent long-term service contract.
    c. Refrigerant type.
    d. Refrigerant charge in pounds of refrigerant per ton of gross cooling capacity.
    e. Tested refrigerant leakage rate, in percent per year. A default rate of 2% will be used unless otherwise demonstrated by test data.
    f. Tested end-of-life refrigerant loss, in percent. A default rate of 10% will be used unless otherwise demonstrated by test data.

1.7 LEED BUILDING SUBMITTAL REQUIREMENTS:

A. The LEED BUILDING Submittal information must be assembled into one package per contract specification section(s) (or per subcontractor), and submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. Incomplete or inaccurate LEED BUILDING submittals may be used as the basis for the rejection of products or assemblies. Incomplete or inaccurate LEED BUILDING Submittals may be used as the basis for rejecting the submitted products or assemblies.

1.8 LEED ACTION PLANS:

A. Construction Waste Management Plan- Refer to Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for detailed submittal requirements.

B. Construction IAQ Management Plan- Refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS for detailed submittal requirements.

C. Erosion and Sedimentation Control Plan:

1. The Plan must be in accordance with the New York State Department of Environmental Conservation (NYSDEC) or the 2003 EPA Construction General Permit, whichever is more stringent.

2. The Plan must be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEEDURES.

3. Detailed requirements: ESC Plan

   a. Include the Stormwater Pollution Prevention Plan, if required.

   b. Identify the party responsible for Plan monitoring and documentation. The party must be regularly on site.

   c. Describe all site work that will be implemented on the project.

   d. Provide site plan with location of ESC measures, including, but not limited to, stormwater quantity controls, stormwater quality controls, stabilized construction entrances, washdown areas, and inlet/catch basin protection.

   e. Describe the inspection and maintenance of the ESC measures. Provide a construction schedule indicating weekly site review.

   f. Describe reporting and documentation measures.

4. Detailed requirements: ESC Measures

5. Submittal requirements: ESC Tracking Log

   a. Note date of major rain events, describe damage, describe any repairs or maintenance performed, and note responsible party.

   b. Note date and findings of weekly site review, describe any repairs or maintenance performed, and note responsible party.

   c. Submit monthly.

6. Implementation

   a. The Contractor must implement the ESC Plan, coordinate the Plan with all affected trades, and designate one individual as the Erosion and Sedimentation Control Representative, who will be responsible for communicating the progress of the Plan with the Commissioner on a regular basis, and for assembling the required LEED documentation.

b. The Contractor must be responsible for the provision, maintenance, and repair of all ESC measures.

c. Demonstration. The Contractor must provide on-site instruction of proper construction practices required to prevent erosion and sedimentation.

d. Meetings. Urgent or ongoing ESC issues will be discussed at weekly on-site job meetings.

1.9 QUALITY ASSURANCE:

A. The Contractor must implement all LEED Action Plans, coordinate the Plans and LEED Building Submittals with all affected trades, and designate one individual as the Sustainable Construction Representative at no additional cost to the City of New York, who will be responsible for communicating the progress of LEED activities with the Commissioner on a regular basis, and for assembling the required LEED documentation.

B. Responsibilities of Contractor's Subcontractors: The Contractor is responsible for his/her subcontractors complying with the LEED Action Plans and for providing required LEED documentation as required for the project.

C. Distribution and Compilation: The Contractor is responsible for distributing the EBMCF and any other forms or templates required for the subcontractors to record LEED documentation. The Contractor also be responsible for collecting and compiling EBMCF information into packages as described in Section 01 33 00 SUBMITTAL PROCEDURES.

D. Meetings: Sustainable design and construction issues must be discussed at the following meetings:

1. Demolition kick-off meeting
2. Construction kick-off meeting
3. Construction kick-off meeting for LEED (independent meeting)
4. Weekly job-site progress and coordination meetings
5. Closeout meeting

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13.03

ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM

Contractor Name: _____
Contractor Contact: _____
Telephone Number: _____

Project Name: _____
Project I.D.: _____

Product/Manufacturer	Material Cost[1]	Recycled Content			Regional[4]			Rapidly Renewable[7]		VOC content[8]		Flooring[9]	Wood	
		Pre-Consumer (% by wt)[2]	Post-Consumer (% by wt)[3]	Total % (½ Pre + Post)	Location & Distance to Extraction[5]	Location & Distance to Manufacture[6]	Extracted & Manuf. (% by wt)	Material	% by wt	*VOC content listed	*VOC content allowed	*Green Label or FloorScore	*Added urea formaldehyde (Yes/No) [10]	FSC Certified[11] (% by wt)

[1] **Material Cost:** As it appears on the manufacturer's or distributor's invoice to the contractor or subcontractor. Does not include labor or equipment costs associated with installation.

[2] **Pre-Consumer Recycled Content:** Industrial/manufacturing waste material (e.g., fly-ash and synthetic gypsum, both waste products from coal burning electricity plants) diverted from landfill and incorporated into a finished product. Scrap raw materials that can be reused in the same manufacturing process from which they are recovered are not considered Pre-Consumer Recycled Content.

[3] **Post-Consumer Recycled Content:** Material or product that has served its intended consumer use (e.g., an empty plastic bottle) and has been diverted from landfill and incorporated into a finished product.

[4] **Regional:** Refers to a material/product that is BOTH extracted AND manufactured within 500 miles of the Project site. Record this information ONLY for materials/products meeting BOTH of these criteria.

[5] **Extraction:** Refers to the location from which the raw resources used in a building product are extracted, harvested, or recovered.

[6] **Manufacture:** Refers to the location of the final assembly of components into a building product that is furnished and installed by the Contractor.

[7] **Rapidly Renewable:** Refers to materials/products derived from agricultural products that are typically harvested within a ten-year or shorter cycle.

[8] **VOC Content:** The quantity of volatile organic compounds contained in adhesives, sealants. paints and architectural coatings. Reported in grams/liter or lbs/gallon, less water.

[9] **Flooring:** For carpet, indicate Carpet and Rug Institute (CRI) Green Label Plus certification. For carpet cushion, indicate CRI Green Label certification. For all flooring except unfinished/untreated wood and mineral-based flooring (tile, masonry, terrazzo, cut stone) without organic-based coatings or sealants, indicate Resilient Floor Covering Institute FloorScore rating. VOC limits for adhesives, sealants, etc. still apply.

[10] **Added Urea Formaldehyde:** Applies to composite wood and agrifiber products only (plywood, particleboard, MDF, OSB, wheatboard, strawboard). Resins or binders with added urea formaldehyde are prohibited.

[11] **FSC Certified:** Certification from the Forest Stewardship Council. This column is only applicable to wood products.

***** Applies only to materials/products installed within the weather barrier.

Contractor Certification:

I, _____ a duly authorized representative of_____ (the Contractor) hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by the Contractor as components of the final building construction. Furthermore, I understand that any change in such qualifications during the purchasing period will require prior written approval from the Commissioner.

Signature of Authorized Representative: _____ Date: _____

SECTION 01 81 13.04
SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13.04

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. LEED BUILDING - GENERAL REQUIREMENTS**:**

The City of New York is committed to implementing good environmental practices and procedures which include achieving a LEED™ Green Building rating. Specific Project requirements related to this goal are listed in the applicable paragraphs of this section of the General Conditions. The Contractor must ensure that these requirements as defined in the sections below and in related sections of the Contract Documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, will not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. This Section includes:

1. Definitions
2. LEED Provisions
3. LEED Building Submittals
4. LEED Building Submittal Requirements
5. LEED Action Plan
6. VOC Requirements for Interior Adhesives and Sealants
7. VOC Requirements for Interior Paints and Coatings
8. Low-Emitting Materials, Flooring
9. Low-Emitting Materials, Composite Wood
10. Low-Emitting Materials, Ceilings, Walls, Thermals and Acoustic Insulation
11. Low-Emitting Materials, Furniture
12. Low-Emitting Materials, Exterior Applied Products
13. Low-Emitting Materials, Additional Low-Emitting Requirements

C. This Section includes requirements for Volatile Organic Compound (VOC) emissions and content in specific materials used within the Project.

D. All sections in the Project Specifications with adhesives, sealant or sealant primer applications, paints, coatings, flooring, composite wood, ceilings, walls, thermal and acoustic insulation, furniture, and for healthcare and schools, exterior applied products, must follow all requirements of this section. In the event of any conflict or inconsistency between this section and the Specifications regarding adhesives, sealant or sealant applications, paints, coatings, flooring, composite wood, ceilings, walls, thermal and acoustic insulation, furniture, and for healthcare and schools, exterior applied products, the requirements set forth in this Section will prevail.

1.3 RELATED SECTIONS: Include without limitation the following:

A.	Section 01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
B.	Section 01 81 19	INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS
C.	Section 01 91 13	GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS
D.	Section 01 91 15	GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Adhesive	Any substance used to bond one surface to another by attachment. Includes adhesive primers and adhesive bonding primers.
Aerosol Adhesive	Any adhesive packaged as an aerosol with a spray mechanism permanently housed in a non-refillable can designed for hand-held application without the need for ancillary equipment
Agrifiber Products	Products derived from recovered agricultural waste fiber from sources such as cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks and agricultural prunings, processed and mixed with resins to produce panels with characteristics similar to composite wood.
Bio-based materials	Composed in whole or in significant part of biological products, renewable agricultural materials or forestry materials, and must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.
Building Exterior	A structure's primary and secondary weatherproofing system, including waterproofing membranes and air- and water-resistant barrier materials, and all building elements outside that system.
Building Interior	Everything inside a structure's weatherproofing membrane.
Carcinogen	A chemical listed as a known, probable, reasonably anticipated, or possible human carcinogen by the International Agency for Research on Cancer

	(IARC) (Groups 1, 2A, and 2B), the National Toxicology Program (NTP) (Groups 1 and 2), the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) (weight-of-evidence classifications A, B1, B2, and C, carcinogenic, likely to be carcinogenic, and suggestive evidence of carcinogenicity or carcinogen potential), or the Occupational Safety and Health Administration (OSHA).
Certified Wood	See Forest Stewardship Council (FSC) Certified Wood.
Clear Wood Finish	Clear/semi-transparent coating applied to wood substrates to provide a transparent or translucent solid film.
Coating	Liquid, liquefiable or mastic composition that is converted to a solid adherent film after application to a substrate as a thin layer; and is used for decorating, protecting, identifying or to serve some functional purpose such as the filling or concealing of surface irregularities or the modification of light and heat radiation characteristics; and is intended for on-site application to interior or exterior surfaces of buildings. Does not include stains, clear finishes, recycled latex paint, specialty (industrial, marine or automotive) coatings or paint sold in aerosol cans.
Composite Wood	Products composed of wood or plant particles or fibers bonded by a synthetic resin or binder to produce panels such as plywood, particleboard, and medium density fiberboard (MDF). Does not include hardboard, structural panels, glued laminated timber, prefabricated wood I-joists or finger-jointed lumber.
Cradle-to-Gate Assessment	Analysis of a product's partial life cycle, from resource extraction to the factory gate, before it is transported for distribution and sale.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

Enclosure	The exterior plus semi-exterior portions of the building. Exterior consists of the elements of a building that separate conditioned spaces from the outside (i.e., the wall assembly). Semi-exterior consists of the elements of a building that separate conditioned space from unconditioned space or that encloses semi-heated space through which thermal energy may be transferred to or from the exterior or conditioned or unconditioned spaces (e.g., attic, crawl space, basement).
Environmental Product Declaration (EPD)	A statement that the item meets the environmental requirements of, ISO 14025, 14040 and EN 15804, or ISO 21930 and have at least a cradle-to-gate scope.
Extended Producer Responsibility	A waste management strategy, also known as closed-loop program or product take-back, where the manufacturer's responsibility for a product is extended to the post-consumer stage of the product's life-cycle.
Floor Coating	Opaque coating applied to flooring. Excludes industrial maintenance coatings.
Forest Stewardship Council (FSC) Certified Wood	Wood-based materials and products certified in accordance with the Forest Stewardship Council's principles and criteria.
Hazardous Air Pollutant	Any compound listed by the U.S. EPA in the Clean Air Act Section 112(b)(1) as a hazardous air pollutant.
Inherently Non-Emitting Materials	Products that are inherently non-emitting sources of VOCs, including stone, ceramic, powder-coated metals, plated or anodized metals, lass, concrete, clay brick, unfinished solid wood, untreated solid wood. These materials are considered compliant without VOC testing if they do not include integral organic-based surface coatings, binders or sealants.
Lacquer	Clear/semi-transparent coating formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and provide a solid, protective film.

LEED	The Leadership in Energy & Environmental Design rating system developed by the United States Green Building Council (USGBC).
Life-Cycle Assessment	An evaluation of the environmental effects of a product from cradle to grave, as defined by ISO 14040-2006 and ISO 14044-2006.
Mutagen	A chemical that meets the criteria for category 1, chemicals known to induce heritable mutations or to be regarding as if they induce heritable mutations in the germ cells of humans, under the Harmonized System for the Classification of Chemicals Which Cause Mutations in Germ Cells (United Nations Economic Commission for Europe, Globally Harmonized System of Classification and Labeling of Chemicals).
Ozone-Depleting Compounds	A compound with an ozone-depletion potential greater than 0.1 (CFC 11=1) according to the U.S. EPA list of Class I and Class II Ozone-Depleting Substances.
Paint	A pigmented coating. For the purposes of this specification, paint primers are considered to be paints. A. Flat Coating or Paint: Has a gloss of less than 15 (using an 85-degree meter) or less than 5 (using a 60-degree meter). B. Non-Flat Coating or Paint: Has a gloss of greater than or equal to 15 (using an 85-degree meter) or greater than or equal to 5 (using a 60-degree meter). C. Non-Flat High-Gloss Coating or Paint: Has a gloss of greater than or equal to 70 (using a 60-degree meter). Anti-Corrosive / Rust Preventative Paint: Coating formulated and recommended for use in preventing the corrosion of ferrous metal substrates.
Permanently Installed Building Product	See Product.
Primer	Coating that is formulated and recommended for one or more of the following purposes: to provide a firm bond between the substrate and a subsequent coating; to prevent a subsequent coating from being absorbed into the substrate; to prevent harm to a subsequent coating from materials in the

	substrate; or to provide a smooth surface for application of a subsequent coating.
Product	An item that arrives on the Project site either as a finished element ready for installation or as a component to another item assembled on-site. The product unit is defined by the functional requirement for use in the Project; this includes the physical components and services needed to serve the intended function of the permanently installed building product. Similar products within a specification will each contribute as a separate product.
Product-Specific Declaration	Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle-to-gate scope.
Recycled Content	The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer) or after consumer use (post-consumer). Recycled content claims for products must conform to the definition in ISO 14021-1999, Environmental Labels and Declarations, Self-Declared Environmental Claims (Type II Environmental Labeling). Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials. “Pre-consumer” may also be referred to as “post-industrial”.

Regionally Manufactured Materials	Materials that are manufactured, distributed and purchased within a radius of 100 miles from the Project location. Manufacturing refers to all points of manufacture for an assembly of components.
Regionally Extracted, Harvested, or Recovered Materials	Materials which are extracted, harvested or recovered, manufactured, distributed and purchased within a radius of 100 miles from the Project site.
Reproductive Toxin	A chemical listed as a reproductive toxin (including developmental, female, and male toxins) by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et. Seq.).
Sanding Sealer	Clear/semi-transparent coating formulated to seal bare wood. Can be abraded to create a smooth surface for subsequent coatings. Does not include sanding sealers that are lacquers (see Clear Wood Finish above).
Sealant	Any material with adhesive properties, formulated primarily to fill, seal, or waterproof gaps or joints between surfaces. Includes sealant primers and caulks.
Shellac	Clear or pigmented coating formulated solely with the resinous secretions of the lac beetle, thinned with alcohol and formulated to dry by evaporation without chemical reaction. Excludes floor applications.
Solar Reflectance Index (SRI)	A measure of a material's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is equal to 0, and a standard white (reflectance 0.80, emittance of 0.90) is equal to 100.
Stain	Clear semi-transparent/opaque coating formulated to change the color but not conceal the grain pattern or texture of the substrate.
Varnish	Clear/semi-transparent coating, excluding lacquers and shellacs, formulated to dry by chemical reaction on exposure to air. May contain small amounts of pigment.

Volatile Aromatic Compound	Any hydrocarbon compound containing one or more 6-carbone benzene rings, and having an initial boiling point less than or equal to 280 degrees Celsius measured at standard conditions of temperature and pressure.
Volatile Organic Compound (VOC)	Any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate) which vaporizes (becomes a gas) and participates in atmospheric photochemical reactions, as specified in Part 51.00 of Chapter 40 of the U.S. Code of Federal Regulations, at normal room temperatures. For the purposes of this specification, formaldehyde and acetaldehyde are considered to be VOCs.Waterproofing Sealer: A coating that prevents the penetration of water into porous substrates.

1.5 LEED PROVISIONS:

A. Refer to the Addendum for the LEED rating to be achieved for this Project. The provisions to achieve this LEED rating are integrated within the Project construction documents and specifications. Additional LEED requirements are met through aspects of the Project design, including material and equipment selections, which may not be specifically identified as LEED Building requirements. Compliance with the requirements needed to obtain LEED prerequisites and credits will be used as one criterion to evaluate substitution requests.

1.**6 LEED BUILDING SUBMITTALS:**

A. Scope: LEED Building Submittals are required for all permanently installed materials included in General Construction work. For Plumbing, Mechanical and Electrical work, LEED Building Submittals are only required for field-applied adhesives, sealants, paints and coatings. Voluntary inclusion of system components such as piping, pipe insulation, ducts, conduits, plumbing fixtures, faucets and lamp housings must be consistently applied to the Project's LEED credits. Submit all required LEED Building Submittals in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

B. Applicability: The extent of the LEED Building Submittals varies depending on the specification section. Applicable LEED Building Submittals are listed under the "LEED Building Submittals" heading in each specification section. The detailed requirements for the LEED Building Submittals are defined in Sub-Section 1.6 C below.

C. Detailed Requirements: Sub-Sections 1.6 C.1 through 1.6 C.18 below define the information and documents to be submitted for each type of LEED Building Submittal as identified in the LEED Building Submittals heading in each specification section:

1. LEED v4 Material and Resources (MR) Credits Calculator for Building Product Disclosure and Optimization (Disclosure and Optimization Calculator): With each submittal of a product permanently installed in the Project, the Contractor is responsible for the completion of the

Disclosure and Optimization Calculator, which can be found on USGBC's website. The Contractor must maintain an updated Disclosure and Optimization Calculator for all applicable products throughout the Project duration and submit the updated calculator on a monthly basis.

a. The Disclosure and Optimization Calculator will record the information outlined in Items b.-c. below for all permanently installed products, the information outlined in Item d. below for all permanently installed concrete mixes, and the information outlined in Items e.-i. below for all permanently installed products that have the content, disclosure or optimization characteristics described herein:
b. Cost breakdowns for the materials included in the Contractor or subcontractor's scope of work. Cost reporting must include itemized material costs (excluding the Contractor's labor, equipment, overhead and profit).
c. The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).
    1) For each product with recycled content, also indicate the total recycled content value (1/2 x pre-consumer percentage x product value + 1 x post-consumer percentage x product value = total recycled content value).
    2) See additional requirements for concrete in section 1.6.C.1.d below.
d. The percentage (by weight), relative to the total weight of cementitious materials, of supplementary cementitious materials or pozzolans such as fly ash used in each concrete mix used in the Project.
    1) For each concrete mix, submit a complete breakdown of all components, by weight and by cost.
e. Identification (Yes/No) of materials manufactured, distributed and purchased within 100 miles of the Project site AND containing raw materials harvested or extracted within 100 miles of the Project site, if used in the Project, as well as the following information:
    1) Indicate the percentage by weight, relative to the total weight of the product that meets these criteria.
    2) Indicate the point of harvest/extraction/recovery of regional raw materials, the point of final assembly of regional manufactured products, and the distance from each point to the Project site.
f. The percentage (by cost) of "Forest Stewardship Council (FSC) Certified" wood products, if used in the Project.
    1) Record all new wood products, indicating which are FSC-certified. Do not record reclaimed, salvaged, or recycled FSC-certified wood products.
    2) Reclaimed, salvaged, or recycled FSC-certified wood may be recorded as post-consumer recycled content.
g. The number or percentage of products with Environmental Product Declarations (EPD), with fractional or multiplied values as indicated below. If a product used in the Project has an EPD Declaration, submit one of the following:
    1) EPD:
        i. Product-Specific Declaration: Valued as one quarter (1/4) of a product
        ii. Industry-Wide (Generic) EPD: Valued as one half (1/2) of a product
        iii. Product-Specific Type III EPD: Valued as one whole product
    2) Documentation of third-party certification of impact reduction below industry average for at least three of the following categories, valued at 100%:
        i. Global warming potential (greenhouse gases), in CO_2e;
        ii. Depletion of the stratospheric ozone layer, in kg CFC-11;
        iii. Acidification of land and water sources, in moles H+ or kg SO_2;
        iv. Eutrophication, in kg nitrogen or kg phosphate;
        v. Formation of tropospheric ozone, in kg NOx or kg ethene; and depletion of nonrenewable energy resources, in MJ.

3) For 1) and 2) above, if a product is also sourced (extracted, manufactured, purchased) within 100 miles of the site, it is valued as two times the whole product.

4) For 1) and 2) above, structure and enclosure materials may not constitute more than 30% of the value of compliant building products.

h. The number or percentage of products for which Sourcing of Raw Materials has been documented, with fractional or multiplied values as indicated below. If a product used in the Project has documented Sourcing of Raw Materials, submit one of the following:

1) Corporate sustainability report (CSR). Submit one of the following:
   i. Manufacturer's self-declared report: valued as half of a product
   ii. Third-party verified CSR which include environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain: valued as one whole product:
      1. Global Reporting Initiative (GRI) Sustainability Report
      2. Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
      3. U.N. Global Compact: Communication of Progress
      4. ISO 26000: 2010 Guidance on Social Responsibility
      5. Other USGBC approved programs meeting the CSR criteria

2) Documentation of at least one of the responsible extraction criteria below:
   i. Extended producer responsibility program, valued as half of a product
   ii. Bio-based materials, valued as one whole product
   iii. Certified Wood: Wood-based materials include all materials made from wood, including engineered wood products and wood-based panel products, valued as one whole product
   iv. Material Reuse: Materials may be salvaged, refurbished, or reused, valued as one whole product.
   v. Recycled content. The sum of post-consumer recycled content plus one-half the pre-consumer recycled content, based on cost, valued as one whole product.
   vi. Other USGBC approved programs meeting leadership extraction criteria

3) For 1) and 2) above, if a product is also sourced (extracted, manufactured, purchased) within 100 miles of the site: valued as two times the whole product.

4) For 1) and 2) above, structure and enclosure materials may not constitute more than 30% of the value of compliant building products. Products meeting multiple criteria may only be counted once.

i. The number or percentage of products for which Material Ingredients have been disclosed, with fractional or multiplied values as indicated below. If a product used in the Project discloses its Material Ingredients, submit one of the following:

1) Chemical inventory of the product to at least 0.1% (1000 ppm), documented by one of the following:
   i. Manufacturer Inventory
   ii. Health Product Declarations (HPDs)
   iii. Cradle to Cradle (C2C) certifications
   iv. Declare product labels
   v. ANSI/BIFMA e3 Furniture Sustainability Standard (Furniture may be included, providing it is included consistently in all MR Credits.)

2) Documentation of compliance with one of the following material ingredient optimization criteria programs:
   i. GreenScreen benchmarks
   ii. Cradle to Cradle certifications
   iii. REACH optimizations
   iv. Other USGBC approved programs meeting building product optimization criteria

3) Documentation that the product is sourced from a manufacturer that meets all of the below supply chain optimization criteria:
   i. Manufacturer engages in validated and robust safety, health, hazard and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material
   ii. Manufacturer provides independent third party verification of the following conditions for their supply chain, at a minimum:
      1. Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation
      2. Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients
      3. Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients
      4. Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients
      5. Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain
      6. Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain

4) For 2) and 3) above, if a product is also sourced (extracted, manufactured, purchased) within 100 miles of the site: valued as two times the whole product. Products compliant with both 2) and 3) may only be counted once.

5) For 1), 2), and 3) above, structure and enclosure materials may not constitute more than 30% of the value of compliant building products.

2. LEED v4 Indoor Environmental Quality Credit Low-Emitting Materials Calculator (EQ Calculator). With each relevant product submittal, the Contractor is responsible for the completion of the EQ Calculator, which can be found on USGBC's website. The Contractor must maintain an updated EQ Calculator throughout the Project duration for all applicable products and submit the updated calculator on a monthly basis.

   a. The EQ Calculator must record information for all relevant products as outlined below. Include the following documentation. Detailed requirements are listed in b. – j. below.
      1) Volume used of all field applied interior adhesives, sealants, paints & coatings.
      2) VOC content of all field-applied interior adhesives, sealants, paints, and coatings, listed in grams/liter or lbs./gallon, less water.
      3) General Emissions Evaluation for more than 90 percent of all field-applied interior paints, coatings, adhesives, and sealants, by volume, and for 100 percent of all flooring, ceilings, walls, and thermal and acoustic insulation.
      4) Composite Wood Evaluation for all composite wood not covered by other categories.
      5) Furniture Evaluation for 90% of all furniture, by cost.

6) For schools/healthcare only: Exterior-Applied Products Evaluation for 90% of all exterior applied materials, measured by volume. All batt insulation products must contain no added formaldehyde.

b. VOC REQUIREMENTS, GENERAL: The following materials must meet the listed compliance requirements for emissions and content standards, for all applicable categories. All products must comply with each applicable threshold requirement. Refer to LEED BD+C Reference Guide, EQ Credit Low-Emitting Materials for additional guidance.

1) General Emissions Requirements: Products must demonstrate they have been tested and determined compliant in accordance with California Department of Public Health (CDPH), Standard Method v1.1-2010 or v1.2-2017, using the applicable exposure scenario, and stating the range of total VOCs (TVOC) after 14 days measured as specified in the CDPH Standard Method v1.1 as follows:
   i. 0.5mg/m3 or less;
   ii. between 0.5 and 5.0 mg/m3; or,
   iii. 0.50 mg/m3 or more
2) No product may contain any ingredients that are carcinogens, mutagens, reproductive toxins, persistent bioacculmulative compounds, hazardous air pollutants, or ozone-depleting compounds. An exception will be made for titanium dioxide and, for products that are pre-tinted by the manufacturer, carbon black, which must be less than or equal to 1% by weight of the product.
3) No product may contain the following:
   i. methylene chloride
   ii. 1,1,1-trichloroethane
   iii. benzene
   iv. toluene
   v. ethylbenzene
   vi. vinyl chloride
   vii. naphthalene
   viii. 1,2-dichlorobenzene
   ix. di (2-ethylhexyl) phthalate
   x. butyl benzyl phthalate
   xi. di-n-butyl phthalate
   xii. di-n-octyl phthalate
   xiii. diethyl phthalate
   xiv. dimethyl phthalate
   xv. isophorone
   xvi. antimony
   xvii. cadmium
   xviii. hexavalent chromium
   xix. lead
   xx. mercury
   xxi. formaldehyde
   xxii. methyl ethyl ketone
   xxiii. methyl isobutyl ketone
   xxiv. acrolein
   xxv. acrylonitrile
4) No product may contain more than 1.0% by weight of sum total of volatile aromatic compounds.

c. VOC REQUIREMENTS FOR INTERIOR ADHESIVES AND SEALANTS:
1) For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the following limits for VOC content when calculated

according to South Coast Air Quality Management District (SCAQMD) Rule #1168 requirements in effect on July 1, 2005, and rule amendment date January 7, 2005:

	Allowable VOC Content (g/L):
Architectural Applications:	
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Dry wall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single ply roof membrane adhesives	250
Specialty Applications:	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Computer diskette manufacturing	350
Contact adhesive	80
Special purpose contact adhesive	250
Tire retread	100
Adhesive primer for traffic marking tape	150
Structural wood member adhesive	140
Sheet applied rubber lining operations specialty	850
Top and Trim adhesive	250
Substrate Specific Applications:	
Metal to metal substrate specific adhesives	30
Plastic foam substrate specific adhesives	50
Porous material (except wood) substrate specific adhesives	50
Wood substrate specific adhesives	30
Fiberglass substrate specific adhesives	80
Sealants:	
Architectural sealant	250
Marine deck sealant	760
Nonmember roof sealant	300
Roadway sealant	250
Single-ply roof membrane sealant	450
Other sealant	420
Sealant Primers:	
Architectural non-porous sealant primer	250
Architectural porous sealant primer	775

Modified bituminous sealant primer	500
Marine deck sealant primer	760
Other sealant primer	750
Other	
Other adhesives, adhesive bonding primers, adhesive primers or any other primers	250

2) For field applications that are inside the weatherproofing system, a minimum of 90 percent of adhesives and sealants, by volume, must comply with the requirements of the CDPH "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

d. VOC REQUIREMENTS FOR INTERIOR PAINTS AND COATINGS:

1) For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the SCAQMD Rule #1113, effective June 3, 2011.

Product Type:	Allowable VOC Content (g/L):
Bond Breaker	350
Clear wood finishes - Varnish	275
Clear wood finishes – Sanding Sealer	275
Clear wood finishes - Lacquer	275
Colorant – Architectural Coatings, excluding IM coatings	50
Colorant – Solvent Based IM	600
Colorant - Waterborne IM	50
Concrete – Curing compounds	100
Concrete – Curing compounds for roadways & bridges	350
Concrete surface retarder	50
Driveway Sealer	50
Dry-fog coatings	50
Faux finishing coatings - Clear topcoat	100
Faux finishing coatings – Decorative Coatings	350
Faux finishing coatings - Glazes	350
Faux finishing coatings - Japan	350
Faux finishing coatings – Trowel applied coatings	50
Fire-proof coatings	150
Flats	50
Floor coatings	50
Form release compounds	100
Graphic arts (sign) coatings	150
Industrial maintenance coatings	100
Industrial maintenance coatings – High temperature IM coatings	420
Industrial maintenance coatings – Non-sacrificial anti-graffiti coatings	100
Industrial maintenance coatings – Zinc rich IM primers	100

Magnesite cement coatings	450
Mastic coatings	100
Metallic pigmented coatings	150
Multi-color coatings	250
Non-flat coatings	50
Pre-treatment wash primers	420
Primers, sealers and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Roof coatings, aluminum	100
Roof primers, bituminous	350
Rust preventative coatings	100
Stone consolidant	450
Sacrificial anti-graffiti coatings	50
Shellac- Clear	730
Shellac – Pigmented	550
Specialty primers	100
Stains	100
Stains, interior	250
Swimming pool coatings – repair	340
Swimming pool coatings – other	340
Traffic Coatings	100
Waterproofing sealers	100
Waterproofing concrete/masonry sealers	100
Wood preservatives	350
Low solids coatings	120

2) For field applications that are inside the weatherproofing system, 90 percent of paints and coatings must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

e. LOW-EMITTING MATERIALS, FLOORING: Flooring must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
f. LOW-EMITTING MATERIALS, COMPOSITE WOOD: Composite wood, agrifiber products, and adhesives must be made using ultra-low-emitting formaldehyde (ULEF) resins as defined in the CARB's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or must be made with no added formaldehyde.
g. LOW-EMITTING MATERIALS, CEILINGS, WALLS, THERMAL, AND ACOUSTIC INSULATION: Ceilings, walls, and thermal and acoustic insulation must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
h. LOW-EMITTING MATERIALS, FURNITURE: At least 90 percent of furniture, measured by cost, will be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011; comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach; and model the test results using the open plan, private office, or seating scenario in ANSI/BIFMA M7.1, as appropriate.
i. LOW-EMITTING MATERIALS, EXTERIOR APPLIED MATERIALS (HEALTHCARE/ SCHOOLS ONLY): At least 90 percent of exterior applied materials, measured by volume,

must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

1) The following materials are prohibited and do not count toward total percentage compliance:
   a) Hot-mopped asphalt for roofing.
   b) Coal tar sealants for parking lots and other paved surfaces.

j. LOW-EMITTING MATERIALS, ADDITIONAL LOW-EMITTING REQUIREMENTS: If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.

1) If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.

2) Methylene chloride and perchloroethylene may not be intentionally added in adhesives, sealants, paints or coatings.

3. BACK-UP DOCUMENTATION: For each material listed in the Disclosure and Optimization Calculator or the EQ Calculator, provide and submit in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, including but not limited to the documentation to certify the material's LEED Building attributes, as applicable:

a. INSTALLATION ON LOCATION: Submit indication of the installation location of products other than adhesives, sealants, paints and coatings. Installation locations should be categorized as one of the following:
   1) Ceiling
   2) Wall
   3) Floor
   4) Subfloor
   5) Built-In Cabinetry
   6) Free-Standing Cabinetry
   7) Vertical Structural Elements
   8) Overhead Structural Elements

b. RECYCLED CONTENT: Submit published product literature or letter of certification on the manufacturer's letterhead certifying the amounts of post-consumer and/or post-industrial content.

c. REGIONAL SOURCING (WITHIN 100 MILES): Submit published product literature or letter of certification on the manufacturer's letterhead indicating the city/state where the manufacturing plant is located, where each of the raw materials in the product were extracted, harvested or recovered, manufactured, distributed and the distance in miles from the Project site.
   1) If only some of the raw materials for a particular product or assembly originate within 100 miles of the Project site, provide the percentage (by weight) that these materials comprise in the complete product.

d. BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION: Submit published third-party or manufacturer's product literature or letter of certification, on the third-party or manufacturer's letterhead, certifying the documented disclosure and optimization information.

e. VOC EMISSIONS AND CONTENT: Submit Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings, flooring, composite wood, ceilings, walls, thermal and acoustic insulation, furniture, and for healthcare and schools, exterior applied products. MSDS must

indicate the VOC emissions and content of products submitted. (If an MSDS does not include a product's VOC emissions and content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer must be submitted in addition to the MSDS to indicate the VOC emissions and content). Submit product third-party certificates and test reports, stating the testing methodology and the model, to include units that are consistent with those required. For wet-applied products, the manufacturer's documentation must state each product's classification and application according to the referenced standard's definition.

4. PRODUCT CUT SHEETS: Submit product cut sheets with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project.

5. FSC-CERTIFIED WOOD: If FSC-Certified Wood is used in the Project, submit:
   a. Copies of vendor's invoices itemizing all new wood purchases, showing the cost for each line item.
   b. For FSC-certified products, the vendor invoice must list product's FSC content percent and its Chain-of-Custody (CoC) certification number.
   c. For FSC-certified products, submit the product and producer's CoC certificates.
   d. For FSC-certified products modified on-site, submit on-site installer's CoC certification.
   e. For assemblies, submit the percentage (by cost and by weight) of the assembly that is FSC-certified wood and published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the percentage that is FSC-certified wood.

6. HIGH ALBEDO PAVING AND WALKWAY MATERIALS: For paving and walkway materials made from concrete or brick, submit published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying a minimum 3-year aged Solar Reflectance (SR) value of 0.28. If 3-year aged value information is not available, submit published product literature or letter verifying an initial SR value of at least 0.33 at installation.

7. HIGH ALBEDO ROOFING MATERIALS: For exposed roofing membranes, pavers, and ballast products, submit published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the following minimum Solar Reflectance Index (SRI) values, calculated according to ASTM E 1980. Reflectance will be measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance will be measured according to ASTM E 408 or ASTM C 1371. Vegetated roof surfaces are exempt from the SRI criteria.

   a. 82 for initial SRI, or 64 for 3-year aged SRI for low-sloped roofing applications (slope ≤ 2:12)
   b. 39 for initial SRI or 32 for 3-year aged SRI for steep-sloped roofing applications (slope > 2:12)

8. LOW MERCURY LAMPS: For all fluorescent, compact fluorescent and HID lamps installed in the Project, submit the total number of each lamp type and submit published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the following information. Preheat, T-9, T-10 and T-12 fluorescents or mercury vapor high-intensity discharge (HID) lamps must not be installed in the Project. For healthcare projects only, probe-start metal halide HID lamps must not be installed in any interior spaces.

   a. The mercury content or content range per lamp in milligrams or picograms, meeting the following criteria;

Lamp	Maximum Mercury Content (milligram)
T-8 fluorescent, eight-foot	10 mg
T-8 fluorescent, four-foot	3.5 mg
T-8 fluorescent, U-bent	6 mg
T-5 fluorescent, linear	2.5 mg
T-5 fluorescent, circular	9 mg
Compact fluorescent, nonintegral ballast	3.5 mg
Compact fluorescent, integral ballast	3.5 mg, ENERGY STAR qualified

High-pressure sodium, up to 400 watts	10 mg
High-pressure sodium, above 400 watts	32 mg

b. The design light output per lamp (light at 40% of a lamp's useful life) in lumens; and
c. The rated average life of the lamp in hours.

9. EXIT SIGNS: Illuminated exit signs must not contain mercury, and must use less than 5 watts of electricity.

10. CONCRETE: Submit concrete mix design for each mix, designated by a distinct identifying code or number and signed by a Professional Engineer licensed in the state of New York.

11. INTERIOR LIGHTING FIXTURES: For each lighting fixture type installed within the building's weather barrier, submit manufacturer's cut sheets indicating the following:

    a. Fixture power in watts.
    b. Initial lamp lumens.
    c. Photometric distribution data.
    d. Dimming capability, in range of percentages.

12. EXTERIOR LIGHTING FIXTURES: For each lighting fixture type installed on site, submit manufacturer's cut sheets indicating the following:

    a. Fixture power in watts.
    b. Initial lamp lumens.
    c. Photometric distribution data.
    d. Range of field adjustability, if any.
    e. Warranty of suitability for exterior use.

13. ALTERNATIVE TRANSPORTATION: Submit manufacturer's cut sheets and/or shop drawings for the following items installed on site:

    a. Bike racks, including total number of bicycle slots provided.
    b. Signage indicating parking spaces reserved for electric or low-emitting vehicles and for carpools/vanpools, including total number of signs.

14. WATER CONSERVING FIXTURES: For all water consuming plumbing fixtures and fittings, submit manufacturer's cut sheets showing maximum flow rates and/or flush rates.

15. ENERGY SAVING APPLIANCES: Submit manufacturer's cut sheets and published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the product's rating under the U.S. EPA/DOE Energy Star program, for all of the following:

    a. Appliances (i.e., refrigerators, dishwashers, microwave ovens, televisions, clothes washers, clothes dryers, chilled water dispensers).
    b. Office equipment (i.e., copy machines, fax machines, plotters/printers, scanners, binding and publishing equipment).
    c. Electronics (i.e., servers, desktop computers, computer monitor displays, laptop computers, network equipment).
    d. Commercial food service equipment.

16. GLAZING: For glazing in any windows, doors, storefront and window wall systems, curtainwall systems, skylights, and partitions, submit manufacturer's cut sheets indicating the following:

    a. Glazed area.
    b. Visible light transmittance.
    c. Solar heat gain coefficient.
    d. Fenestration assembly u-factor.

17. VENTILATION: Submit manufacturer's cut sheets for the following:
    a. Carbon dioxide monitoring systems, if any, installed to measure outside air delivery.
    b. Air filters: for detailed requirements refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS.
18. REFRIGERATION: For all refrigeration equipment, submit manufacturer's cut sheets indicating the following:
    a. Equipment type.
    b. Equipment life. Default values specified by the 2007 ASHRAE Applications Handbook will be used unless otherwise demonstrated by the manufacturer's guarantee and an equivalent long-term service contract.
    c. Refrigerant type.
    d. Refrigerant charge in pounds of refrigerant per ton of gross cooling capacity.
    e. Tested refrigerant leakage rate, in percent per year. A default rate of 2% will be used unless otherwise demonstrated by test data.
    f. Tested end-of-life refrigerant loss, in percent. A default rate of 10% will be used unless otherwise demonstrated by test data.

1.7 LEED BUILDING SUBMITTAL REQUIREMENTS:

A. The LEED Building Submittal information must be assembled into one package per contract specification section(s) (or per subcontractor), and submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. Incomplete or inaccurate LEED Building Submittals may be used as the basis for the rejection of products or assemblies.

B. All final LEED Building Submittal information with back-up documentation must be submitted within two (2) months of the Project's substantial completion. If in the Project's LEED review, the USGBC or their third party reviewer requires additional documentation as it relates to the LEED Building Submittals, the Contractor must provide the requested documentation within two (2) weeks.

1.8 LEED ACTION PLANS:

A. Construction Waste Management Plan- Refer to Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for detailed requirements.

B. Construction IAQ Management Plan- Refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS for detailed requirements.

C. Erosion and Sedimentation Control (ESC) Plan:
    1. The Plan must be in accordance with the New York State Department of Environmental Conservation (NYSDEC)'s New York State Standards and Specifications for Erosion and Sediment Control (Blue Book) or the 2012 EPA Construction General Permit, whichever is more stringent.
    2. The Plan must be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
    3. Detailed requirements: ESC Plan
        a. Include the Stormwater Pollution Prevention Plan, if required.
        b. Identify the party responsible for Plan monitoring and documentation. The party must be regularly on site.
        c. Describe all site work that will be implemented on the Project and include timing of implementation.

d. Submit site plan with location of ESC measures, including, but not limited to, stormwater quantity controls, stormwater quality controls, stabilized construction entrances, washdown areas, inlet/catch basin protection and perimeter controls.
e. Establish and clearly delineate construction buffer zones to avoid soil compaction and other construction damage to greenfields.
f. Describe the inspection and maintenance protocols of the ESC measures. Submit a construction schedule indicating weekly site review.
g. Describe reporting and documentation measures.

4. Detailed requirements: ESC Tracking Log
   a. Note date of major rain events, describe damage, describe any repairs or maintenance of specific control measures performed, and note responsible party.
   b. Note date and findings of weekly site review, describe any repairs or maintenance performed, and note responsible party. Submit date-stamped photographs, inspection reports or other recording processes.
   c. Submit monthly.
5. Implementation
   a. Before Demolition and/or Construction begins, the Contractor will implement the ESC Plan, coordinate the Plan with all affected trades, and designate one individual as the Erosion and Sedimentation Control Representative, who will be responsible for communicating the progress of the Plan with the Commissioner monthly, and for assembling the required LEED documentation.
   b. The Contractor is responsible for the provision, maintenance, and repair of all ESC measures. Any problems identified in site inspections must be resolved in a timely manner.
   c. Demonstration. The Contractor must provide on-site instruction of proper construction practices required to prevent erosion and sedimentation.
   d. All subcontractors must promptly notify the ESC Representative if damage to an ESC measure is observed.
   e. Meetings. Urgent or ongoing ESC issues must be discussed at weekly on-site job meetings.
6. All projects, including zero lot line buildings and projects that cause minimal or even no exterior site disturbance, must have ESC Plan that meets requirements.
7. Contractor must save such original documents for the life of the Project plus seven (7) years.

1.9 QUALITY ASSURANCE:

A. The Contractor must implement all LEED Action Plans, coordinate the Plans and LEED Building Submittals with all affected trades, and designate one individual as the Sustainable Construction Representative at no additional cost to the City of New York, who will be responsible for communicating the progress of LEED activities with the Commissioner monthly, and for assembling the required LEED documentation. The Contractor must facilitate measurements taken by authorized parties on site for LEED compliance verification purposes.

B. Responsibilities of Contractor's Subcontractors: The Contractor is responsible for his/her subcontractors complying with the LEED Action Plans and for providing required LEED documentation as required for the Project.

C. Distribution and Compilation: The Contractor is responsible for distributing the LEED v4 MR Credits Calculator for Building Product Disclosure and Optimization, the LEED v4 EQ Credit Low-Emitting Materials Calculator, and any other forms or templates required for the subcontractors to record LEED documentation. The Contractor is also responsible for collecting and compiling Building Product Disclosure and Optimization and Low-Emitting Materials information into packages as described in Section 01 33 00 SUBMITTAL PROCEDURES.

D. Meetings: Sustainable design and construction issues must be discussed at the following meetings in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION:
   1. Demolition kick-off meeting

2. Construction kick-off meeting
3. Construction kick-off meeting for LEED (independent meeting)
4. Weekly job-site progress and coordination meetings
5. Closeout meeting

1.10 REFERENCES:

A. New York State Standards and Specifications for Erosion and Sediment Control, amended November 2016: http://www.dec.ny.gov/docs/water_pdf/2016nysstanec.pdf

B. 2012 EPA Construction General Permit: https://www.epa.gov/npdes/epas-2012-construction-general-permit-cgp-and-related-documents

C. South Coast Air Quality Management District (SCAQMD), Rule 1168: www.aqmd.gov

D. South Coast Air Quality Management District (SCAQMD), Rule 1113: www.aqmd.gov

E. CDPH Standard Method v1.1-2010: www.cal-iaq.org

F. ISO 17025: www.iso.org

G. ISO Guide 65: www.iso.org

H. CARB 93120 ATCM: arb.ca.gov/toxics/compwood/compwood.htm

I. ANSI/BIFMA M7.1 Standard Test Method for Determining VOC Emissions from Office Furniture Systems, Components and Seating: bifma.org

J. ANSI/BIFMA e3-2011 Furniture Sustainability Standard: bifma.org

K. ISO 14021–1999, Environmental labels and declarations—Self Declared Claims (Type II Environmental Labeling): www.iso.org

L. ISO 14025–2006, Environmental labels and declarations (Type III Environmental Labeling): www.iso.org

M. ISO 14040–2006, Environmental management, Life cycle assessment principles, and frameworks: www.iso.org

N. ISO 14044–2006, Environmental management, Life cycle assessment requirements, and guidelines: www.iso.org

O. International Standard ISO 21930–2007 Sustainability in building construction—Environmental declaration of building products: www.iso.org

P. Federal Trade Commission, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e): www.ftc.gov/bcp/grnrule/guides980427.htm

Q. Global Reporting Initiative (GRI) Sustainability Report: www.globalreporting.org/

R. Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises: www.oecd.org/daf/internationalinvestment/guidelinesformultinationalenterprises/

S. U.N. Global Compact, Communication on Progress: www.unglobalcompact.org/participation/report/cop

T. ISO 26000—2010 Guidance on Social Responsibility: www.iso.org/iso/home/standards/iso26000.htm

U. Forest Stewardship Council: www.ic.fsc.org

V. Sustainable Agriculture Network: www.sanstandards.org

W. The Rainforest Alliance: www.rainforest-alliance.org/

X. ASTM Test Method D6866: www.astm.org/Standards/D6866.htm

Y. Chemical Abstracts Service: www.cas.org/

Z. Health Product Declaration: www.hpd-collaborative.org/

AA. Cradle-to-Cradle CertifiedCM Product Standard: www.c2ccertified.org/product_certification

BB. Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): www.echa.europa.eu/support/guidance-on-reach-and-clp-implementation

CC. GreenScreen: www.greenscreenchemicals.org/method/greenscreen-list-translator

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13.04

SECTION 018113.10
ENVIRONMENTALLY PREFERABLE PURCHASING (EPP) COMPLIANCE

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13.10

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes administrative and procedural requirements for all equipment, material and product purchasing to comply with the requirements of New York City Environmentally Preferable Purchasing (EPP) "Minimum Standards for Construction Products", as established by the Mayor's Office of Contract Services (MOCS). Refer to their website for further guidance.

B. All sections in the Project Specifications with applicable equipment, materials and products will follow all requirements of this section. In the event of any conflict or inconsistency between this section and the Specifications, the more stringent requirements will prevail.

C. This Section includes:

1. Definitions
2. Administrative Requirements
3. Action Submittals
4. Informational Submittals
5. Products, Materials

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Environmentally Preferable Purchasing (EPP) Minimum Standards for Construction Products	The standard that refers to a list of equipment, materials and products that may be specified in construction contracts covered by the EPP laws and provides the applicable minimum standards referenced in the laws. See EPP Minimum Standards for Constructions Products available on MOCS' website for a comprehensive list of all applicable definitions.

1.5 ADMINISTRATIVE REQUIREMENTS:

A. At no additional cost to the City of New York, designate an individual who will be responsible for the communication of progress of EPP activities with the Commissioner on a regular basis and for the quality of all EPP-related materials and preparation, coordination and assembly of the supporting documentation.

B. Scope and Applicability: Action submittals and informational submittals are required for all installed equipment, materials and products that require EPP compliance. Provide all required submittals in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

C. Distribution and Compilation: The Contractor must coordinate with all affected trades and is responsible for his/her subcontractors complying with the EPP requirements and for providing required EPP documentation as required for the project. The Contractor is responsible for distributing the forms or templates required for the subcontractors to record EPP documentation. The Contractor is also responsible for collecting and compiling information into packages as described in Section 01 33 00 SUBMITTAL PROCEDURES.

D. The Contractor must respond in a timely manner to questions and requests from the Commissioner, Design Consultant and MOCS regarding EPP requirements that are the responsibility of the Contractor. Document responses as informational submittals.

1.6 ACTION SUBMITTALS:

A. General Requirements:

1. EPP Documentation Submittals for applicable and compliant product data, as stated in the EPP Minimum Standards for Construction Products, is to be documented in the form of a Vendor Survey and supporting manufacturer's data sheets highlighting EPP compliance-related data. Include in the Vendor Survey the anticipated quantity of product purchased and cost per unit data. See attached sample Vendor Survey form.

2. Compliance with EPP requirements will be used as one criterion to evaluate product selection. Assemble EPP Documentation Submittal information into one package per contract specification section(s) (or per subcontractor). Incomplete or inaccurate EPP Documentation submittals may be used as the basis for the rejection of products or assemblies.

3. Update the quantities and costs in the Vendor Survey once products are approved and purchased and document as information submittal.

1.7 INFORMATIONAL SUBMITTALS

A. For each registered contract, the Contractor must maintain a Master Vendor Survey, an updated tracking log of all equipment, materials and products purchased on a contract that are required to comply with EPP. Submit the Master Vendor Survey on a monthly basis and update the costs once products are purchased.

1. Upon request by MOCS, submit the Master Vendor Survey and supporting documents.

B. EPP Progress Reports: Concurrent with each Application for Payment, submit reports of purchasing activities for each of the EPP-applicable equipment, materials and products listed in Sub-section C below.

C. Project Materials Cost Data: For Vendor Survey and EPP Progress Reports, include breakout of costs for the following categories of items:

1. Appliances.
2. Architectural Coatings.
3. HVAC Equipment.
4. Lighting Products.
5. Miscellaneous Products – Construction.
6. Plumbing Fixtures.

PART II – PRODUCTS

2.1 MATERIALS:

A. Detailed Requirements. This sub-section defines the information and documents to be provided for each EPP-applicable equipment, material and product type, as identified in each specification section:

1. Appliances – Residential:

   All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following residential appliances shall comply with this requirement:

   a. Clothes Washers
   b. Dehumidifiers
   c. Dishwashers, Standard-Sized
   d. Freezers, Upright, Chest and Compact
   e. Refrigerators and Refrigerator-Freezers, Standard-Sized and Compact

   Microwave Ovens shall comply with the following requirements:

   a. Recommended Standby Levels: 2 watts or less
   b. Best Available Standby Level: 2 watts or less

2. Architectural Coatings:

   a. For the products listed below, the maximum content of Volatile Organic Compounds (VOCs) shall be determined according to the American Society for Testing and Materials test method D 5116 (Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products).

Architectural Coating	**Maximum Concentration of VOC in Grams per Liter**
Clear Wood Coating – Clear-Brushing lacquers	275
Clear Wood Coating – Sanding Sealers (Other than Lacquers)	275
Clear Wood Coating –Varnishes	275
Floor Coatings	100
Lacquers - Pigmented	275
Primers for Flat Paint	100
Primers for Non-Flat Paint	150
Rust Preventative/Anti-Corrosive Paint	250

b. Any product listed below that is compliant with Part 205 of Title Six of the New York Codes, Rules and Regulations meets the standard required under EPP Minimum Standards for Construction Products. The maximum content of VOCs for these products shall be determined according to the test method required under part 205.6 of such part.

Architectural Coating	**Maximum Concentration of VOC in Grams per Liter**
Clear Wood Coating – Conversion Varnishes	725
Clear Wood Coating – Lacquers (Including Lacquer Sanding Sealers)	550
Concrete Bond Breakers	350
Concrete Curing Compounds	350
Concrete Surface Retarders	780
Dry Fog Coatings	400
Faux Finishing Coatings	350
Fire-Resistive Coatings	350
Fire-Retardant Coatings	650
Fire-Retardant Coatings - Opaque	350
Flat Paint	100
Form Release Compounds	250
Graphic Arts Coatings (Sign Paints)	500
High Temperature Coatings	420
Industrial Maintenance (IM) Coatings	340
Low Solids Coatings	120
Magnesite Cement Coatings	450
Mastic Texture Coatings	300
Metallic Pigmented Coatings	500
Multi-Color Coatings	500
Nonflat High-Gloss Coatings	250
Nonflat Paint	150
Pre-Treatment Wash Primers	420
Primers, Sealers, and Undercoaters	200
Quick-Dry Enamels	250
Quick-Dry Primers, Sealers, and Undercoaters	200
Recycled Coatings	250
Roof Coatings	250
Roof Coatings (Bituminous)	300
Roof Primers (Bituminous)	350
Shellacs – Clear	730
Shellacs – Opaque	550
Specialty Primers, Sealers and Undercoaters	350
Stains	250
Swimming Pool Coatings and Swimming Pool Repair and Maintenance Coatings	340
Thermoplastic Rubber Coatings and Mastics	550
Waterproofing Concrete / Masonry Sealers	400
Waterproofing Sealers	250
Wood Preservatives	350

c. The products listed below shall be recovered material and comply with the Post-consumer Content and Total Recovered Materials Content requirements.

Architectural Coating	Post-consumer Content (%)	Total Recovered Materials Content (%)
Latex Paint – Consolidated	100	100
Latex Paint – Reprocessed White, Off-White and Pastel Colors	20	20
Latex Paint – Reprocessed Grey, Brown, Earthtones and Other Dark Colors	50-99	50-99

3. HVAC Equipment: Commercial and Residential

a. Commercial

All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Commercial HVAC Equipment shall comply with this requirement:

1. Air Conditioners, Air-Cooled
2. Air Conditioners, Gas/Electric Package Units
3. Heat Pumps, Air Source

Chillers shall comply with the following Part Load Optimized Chillers IPLV and Full Load Optimized Chillers IPLV requirements:

Type	Compressor Type and Capacity	Part Load Optimized Chillers IPLV (kW/ton) Required	Full Load Optimized Chillers IPLV (kW/ton) Required
Air-Cooled	Scroll (30 – 60 tons)	0.86 or less	1.23 or less 1.1
Air-Cooled	Reciprocating (30 – 150 tons)	0.90 or less	1.23 or less 1
Air-Cooled	Screw (70 – 200 tons)	0.98 or less	1.23 or less 0.94
Water-Cooled	Centrifugal (150 – 299 tons)	0.52 or less	0.59 or less
Water-Cooled	Centrifugal (300 – 2,000 tons)	0.45 or less	0.56 or less
Water-Cooled	Rotary Screw (>150 tons)	0.49 or less	0.64 or less

b. Residential

All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Residential HVAC Equipment shall comply with this requirement:

1. Air Conditioners, Central (<65,000 Btu/h)

2. Air Conditioners, Central, Gas/Electric Package Units (<65,000 Btu/h)
3. Air Source Heat Pumps (<65,000 Btu/h)
4. Boilers and Boiler/Hot Water Heaters (<300,000 Btu/h)
5. Ceiling Fans
6. Furnaces and Furnace/Hot Water Heaters (<340,000 Btu/h)
7. Ground Source Heat Pumps (Geothermal)
8. In-Line Ventilating Fan
9. Programmable Thermostats
10. Range Hood and Bathroom /Utility Room Ventilating Fans
11. Room Air Cleaners
12. Room Air Conditioners

4. Lighting Products

a. The following lighting products shall comply with the corresponding BEF requirement:

Product Type	**Number of Lamps**	**Required BEF**
Ballast, Fluorescent, Four-Foot, Linear T12, 34-Watts	1	2.64 or higher
Ballast, Fluorescent, Four-Foot, Linear T12, 34-Watts	2	1.41 or higher
Ballast, Fluorescent, Four-Foot, Linear T12, 34-Watts	3	0.93 or higher
Ballast, Fluorescent, Eight-Foot, Linear T12, 60-Watts	2	0.80 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	1	2.54 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	2	1.44 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	3	1.44 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	4	0.73 or higher
Ballast, Fluorescent, Eight-Foot, Linear T8, 59-Watts	2	0.80 or higher
Ballast, Fluorescent, Four-Foot, U-Bent T12, 34-Watts	1	2.64 or higher
Ballast, Fluorescent, Four-Foot, U-Bent T12, 34-Watts	2	1.41 or higher
Ballast, Fluorescent, Four-Foot, U-Bent T12, 34-Watts	3	0.93 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	1	2.54 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	2	1.44 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	3	0.93 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	4	0.73 or higher

b. All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Lighting Products shall comply with this requirement:

1. Exit Signs
2. Luminaires, Residential

c. Luminaires, Downlight, With Compact Fluorescent Lamps (13-32 Lamp Wattage) shall comply with the following LER requirements:

Luminaire Type (NEMA Designation)	Required LER
Open Optics	29 or higher
Baffled Optics	21 or higher
Lensed Optics	24 or higher

d. Luminaires, Downlight, With Metal Halide Lamps (<150 Watts) shall comply with the following LER requirements:

Luminaire Type (NEMA Designation)	Required LER
Open Optics	35 or higher
Lensed Optics	30 or higher

e. Luminaires, Fluorescent shall comply with the following LER requirements:

Luminaire Type (NEMA Designation)	Number of Lamps	Required LER
Lensed (FL)	2	62 or higher
Lensed (FL)	3	61 or higher
Lensed (FL)	4	61 or higher
VDT-Preferred Louvered (FP)	2	50 or higher
VDT-Preferred Louvered (FP)	3	51 or higher
VDT-Preferred Louvered (FP)	4	54 or higher
Four-Foot (FW)	2	63 or higher
Four-Foot (FW)	4	62 or higher
Four-Foot (FS)	1	70 or higher
Four-Foot (FS)	2	70 or higher
Four-Foot (FI)	1	67 or higher
Eight-Foot (FI)	2	68 or higher

f. Luminaires, Industrial HID, With High Pressure Sodium Lamps (<150 Lamp Wattage) shall comply with the following LER requirements:

Upward Efficiency	Lamp Wattage	Closed Fixture (HR) LER Required	Open Fixture (HR) LER Required
0%	150-399	58 or higher	68 or higher
0%	400-999	63 or higher	84 or higher
0%	>1000	N/A	N/A
1%-10%	150-399	64 or higher	63 or higher
1%-10%	400-999	82 or higher	89 or higher
1%-10%	>1000	N/A	109 or higher
11%-20%	150-399	N/A	78 or higher

11%-20%	400-999	N/A	94 or higher
11%-20%	>1000	N/A	N/A
>20%	150-399	75 or higher	77 or higher
>20%	400-999	N/A	N/A
>20%	>1000	N/A	N/A

5. Miscellaneous Products – Construction

   a. For the products listed below, the maximum content of Volatile Organic Compounds (VOCs) shall be determined according to the American Society for Testing and Materials test method D 5116 (Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products). The products may not contain any volatile organic compound in any concentration exceeding that specified below. Products that are compliant with the Green Label Plus program of the Carpet and Rug Institute are also compliant with this standard.

Carpet Adhesives		
Volatile Organic Compound	**24-Hour Testing Maximum Emission Factor (µg/m2•hr)**	**14-Day Testing Maximum Emission Factor (µg/m2•hr)**
Formaldehyde	50	31
2-ethyl-1-hexanol	300	300
Total Volatile Organic Compounds	800	N/A
Carpet Cushions		
Volatile Organic Compound	**24-Hour Testing Maximum Emission Factor (µg/m2•hr)**	**14-Day Testing Maximum Emission Factor (µg/m2•hr)**
Butylated Hydroxytoluene	300	N/A
Formaldehyde	50	N/A
4-Phenylcyclohexene (4PCH)	50	N/A
Total Volatile Organic Compounds	1000	N/A
Carpets		
Volatile Organic Compound	**24-Hour Testing Maximum Emission Factor (µg/m2•hr)**	**14-Day Testing Maximum Emission Factor (µg/m2•hr)**
Formaldehyde	50	30
4-Phenylcyclohexene	50	17
Styrene	410	410
Total Volatile Organic Compounds	500	N/A

b. The products listed below shall comply with the Recycled Post-consumer Content and Total Recovered Materials Content requirements.

Carpet Cushion – Bonded Polyurethane		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Old Carpet Cushion	15-50	15-50
Carpet Cushion – Jute		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Burlap	40	40
Carpet Cushion – Rubber		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Tire Rubber	60-90	60-90
Carpet Cushion – Synthetic Fibers		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Carpet Fabrication Scrape	No Range Recommended	100
Cement and Concrete		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Cenospheres	No Range Recommended	Minimum 10% (by volume)
Coal fly Ash	No Range Recommended	No Range Recommended
GGBF Slag	No Range Recommended	No Range Recommended
Silica Fume	No Range Recommended	5-10% of cementitious material (dry weight basis)
Channelizers		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic	25-90	No Range Recommended
Rubber (base only)	100	No Range Recommended
Delineators – Fixed		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic	25-90	No Range Recommended
Rubber (base only)	100	No Range Recommended
Steel (BOF, base only)	16	25-30
Steel (BOF, base only)	67	100
Delineators – Flexible		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic PET	25-85	No Range Recommended
Floor Tiles		
Material	Recovered Post-consumer Content (%)	Total Recovered Materials Content (%)
Rubber	90-100	No Range Recommended
Plastic	No Range Recommended	90-100
Insulation - Cellulose		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**

Post-consumer Paper	75	75
Insulation - Foam-In-Place		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Recovered Material	No Range Recommended	5
Insulation - Glass Fiber Reinforced		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Recovered Material	No Range Recommended	6
Insulation - Laminated Paperboard		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Post-consumer Paper	100	100
Insulation - Perlite Composition Board		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Post-consumer Paper	23	23
Insulation - Phenolic Rigid Foam	**Insulation - Phenolic Rigid Foam**	**Insulation - Phenolic Rigid Foam**
Material	**Material**	**Material**
Recovered Material	Recovered Material	Recovered Material
Insulation - Plastic, Non-woven Batt	**Insulation - Plastic, Non-woven Batt**	**Insulation - Plastic, Non-woven Batt**
Material	**Material**	**Material**
Recovered and/or Post-consumer Plastic	Recovered and/or Post-consumer Plastic	Recovered and/or Post-consumer Plastic
Insulation - Plastic Rigid Foam, Polyisocyanurate/Polyurethane: Rigid Foam	**Insulation - Plastic Rigid Foam, Polyisocyanurate/Polyurethane: Rigid Foam**	**Insulation - Plastic Rigid Foam, Polyisocyanurate/Polyurethane: Rigid Foam**
Material	**Material**	**Material**
Recovered Material	Recovered Material	Recovered Material
Insulation - Structural Fiberboard	**Insulation - Structural Fiberboard**	**Insulation - Structural Fiberboard**
Material	**Material**	**Material**
Recovered Material	Recovered Material	Recovered Material
Modular Threshold Ramps	**Modular Threshold Ramps**	**Modular Threshold Ramps**
Material	**Material**	**Material**
Steel (BOF)	Steel (BOF)	Steel (BOF)
Steel (EAF)	Steel (EAF)	Steel (EAF)
Aluminum	Aluminum	Aluminum
Rubber	Rubber	Rubber

Nonpressure Pipe		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (BOF)	16	25-30
Steel (EAF)	67	100
Plastic (HDPE)	100	100
Plastic (PVC)	5-15	25-100
Cement	No Range Recommended	No Range Recommended
Playground Equipment		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic	90-100	100
Plastic Composite	50-75	95-100
Steel (BOF)	16	95
Steel (EAF)	50-100	95-100
Restroom Dividers/Partitions, Steel		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (from BOF)	16	25-30
Steel (from EAF)	67	100
Roofing Materials		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (BOF)	16	25-30
Steel (EAF)	67	100
Aluminum	20-95	20-95
Fiber (felt) or Fiber Composite	50-100	50-100
Rubber	12-100	100
Plastic or Plastic/Rubber Composite	100	100
Wood/Plastic Composite	No Range Recommended	100
Cement	No Range Recommended	No Range Recommended
Shower Dividers/Partitions, Steel		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (from BOF)	16	25-30
Steel (from EAF)	67	100
Traffic Barricades		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic (High Density Polyethylene [HDPE], Low-Density Polyethylene [LDPE], Polyethylene terephthalate [PET])	80-100	100
Steel (BOF)	16	25-30
Steel (EAF)	67	100
Fiberglass	No Range Recommended	No Range Recommended

c. All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Construction Products shall comply with this requirement:

1. Entry or Patio Doors, Residential
2. Residential Skylights
3. Residential Windows & Tubular Daylighting Devices
4. Roof Products

d. Electric Motors shall comply with the following Nominal Efficiencies requirements:

Nominal Efficiencies for Induction Motors Rated 600 Volts or Less (Random Wound)						
Motor Size (HP)		**Open Drip-Proof (ODP)**		**Totally Enclosed Fan-Cooled (TEFC)**		
6-pole (1200 rpm)	**4-pole (1200 rpm)**	**2-pole (1200 rpm)**	**6-pole (1200 rpm)**	**4-pole (1200 rpm)**	**2-pole (1200 rpm)**	
1	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5
5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1
125	95.0	95.4	94.1	95.0	95.4	95.0
150	95.4	95.8	94.1	95.8	95.8	95.0
200	95.4	95.8	95.0	95.8	96.2	95.4
250	95.4	95.8	95.0	95.8	96.2	95.8
300	95.4	95.8	95.4	95.8	96.2	95.8
350	95.4	95.8	95.4	95.8	96.2	95.8
400	95.8	95.8	95.8	95.8	96.2	95.8
450	96.2	96.2	95.8	95.8	96.2	95.8
500	96.2	96.2	95.8	95.8	96.2	95.8

Nominal Efficiencies for Induction Motors Rated Medium Voltage or Less (Form Wound)						
Motor Size (HP)		**Open Drip-Proof (ODP)**		**Totally Enclosed Fan-Cooled (TEFC)**		
6-pole (1200 rpm)	**4-pole (1200 rpm)**	**2-pole (1200 rpm)**	**6-pole (1200 rpm)**	**4-pole (1200 rpm)**	**2-pole (1200 rpm)**	
250-500	95.0	95.0	94.5	95.0	95.0	95.0

6. Plumbing Fixtures.

   The plumbing fixtures shall comply with the following Water Efficiency requirements:

Plumbing Fixture	**Water Efficiency Requirement**
Lavatory Faucets	< 2.0 gallons per minute
Showerheads, Residential and Commercial	< 2.2 gallons per minute
Toilets, Residential and Commercial	< 1.6 gallons per flush
Urinals, Residential and Commercial	< 1.0 gallons per flush

PART III – EXECUTION (Not Used)

END OF SECTION 018113.10

EPP VENDOR SURVEY FORM

Instructions: In the space provided, indicate the following: (1.) Choose Construction for the EPP Book Used (2.) Choose the product type from the drop-down menu; (3.) Choose the product detail from the drop-down menu; (4.) Identify the specific item under Product Description; (5.) Enter the number of products per unit; (6.) Enter the cost per unit; (7.) Enter the units purchased; (8.) Enter the total cost.

Return completed spreadsheet to the contracting agency in the accompanying letter. Thank you.

Agency Acronym	Environmental Preferable Purchasing Information				Quantity and Cost Information				
	EPP Book Used	Product Type	Product Details	Product Description	Products Per Unit	Cost Per Unit	Units Purchased	Total Cost	Comments
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
TOTAL					0.00	$0.00	0.00	$0.00	

SECTION 01 81 13.13
VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS FOR LEED v3 BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13.13

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes requirements for volatile organic compound (VOC) content in adhesives, sealants, paints and coatings used for the project.

B. All sections in the Project Specifications with adhesives, sealant or sealant primer applications, paints and coatings will follow all requirements of this section. In the event of any conflict or inconsistency between this section and the Specifications regarding adhesives, sealant or sealant applications, paints and coatings, the requirements set forth in this Section will prevail.

C. This Section includes:

1. General Requirements
2. References
3. VOC Requirements for Interior Adhesives
4. VOC Requirements for Interior Sealants
5. VOC requirements for Interior Paints
6. VOC requirements for Interior Coatings
7. Submittals

1.3 RELATED SECTIONS: include without limitation the following:

A.	Section 01 10 00	SUMMARY
B.	Section 01 31 00	PROJECT MANAGEMENT AND COORDINATION
C.	Section 01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
D.	Section 01 33 00	SUBMITTAL PROCEDURES
E.	Section 01 73 00	EXECUTION
F.	Section 01 77 00	CLOSEOUT PROCEDURES
G.	Section 01 78 39	CONTRACT RECORD DOCUMENTS
H.	Section 01 81 13.03	SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS
I.	Section 01 81 13.04	SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS
J.	Section 01 81 19	INDOOR AIR QUALITY FOR LEED BUILDINGS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

ADHESIVE	Any substance used to bond one surface to another by attachment. Includes adhesive primers and adhesive bonding primers. A. Aerosol Adhesive: Any adhesive packaged as an aerosol with a spray mechanism permanently housed in a non-refillable can designed for hand-held application without the need for ancillary equipment.
CARCINOGEN	A chemical listed as a known, probable, reasonably anticipated, or possible human carcinogen by the International Agency for Research on Cancer (IARC) (Groups 1, 2A, and 2B), the National Toxicology Program (NTP) (Groups 1 and 2), the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) (weight-of-evidence classifications A, B1, B2, and C, carcinogenic, likely to be carcinogenic, and suggestive evidence of carcinogenicity or carcinogen potential), or the Occupational Safety and Health Administration (OSHA).
CLEAR WOOD FINISH	Clear/semi-transparent coating applied to wood substrates to provide a transparent or translucent solid film. 1. Lacquer: Clear/semi-transparent coating formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and provide a solid, protective film. 2. Sanding Sealer: A sanding sealer that also meets the definition of a lacquer. 3. Varnish: Clear/semi-transparent coating, excluding lacquers and shellacs, formulated to dry by chemical reaction on exposure to air. May contain small amounts of pigment.
COATING	Liquid, liquefiable, or mastic composition that is converted to a solid adherent film after application to a substrate as a thin layer; and is used for decorating, protecting, identifying or to serve some functional purpose such as the filling or concealing of surface irregularities or the modification of light and heat radiation characteristics; and is intended for on-site application to interior or exterior surfaces of buildings. Does not include stains, clear finishes, recycled latex paint, specialty (industrial, marine or automotive) coatings or paint sold in aerosol cans.
FLOOR COATING	Opaque coating applied to flooring. Excludes industrial maintenance coatings.
HAZARDOUS AIR POLLUTANT	Any compound listed by the U.S. EPA in the Clean Air Act, Section 112(b)(1) as a hazardous air pollutant.

MUTAGEN	A chemical that meets the criteria for category 1, chemicals known to induce heritable mutations or to be regarding as if they induce heritable mutations in the germ cells of humans, under the Harmonized System for the Classification of Chemicals Which Cause Mutations in Germ Cells (United Nations Economic Commission for Europe, Globally Harmonized System of Classification and Labeling of Chemicals).
OZONE-DEPLETING COMPOUNDS	A compound with an ozone-depletion potential greater than 0.1 (CFC 11=1) according to the U.S. EPA list of Class I and Class II Ozone-Depleting Substances.
PAINT	A pigmented coating. For the purposes of this specification, paint primers are considered to be paints. 1. Flat Coating or Paint: Has a gloss of less than 15 (using an 85-degree meter) or less than 5 (using a 60-degree meter). 2. Non-Flat Coating or Paint: Has a gloss of greater than or equal to 15 (using an 85-degree meter) or greater than or equal to 5 (using a 60-degree meter). 3. Non-Flat High-Gloss Coating or Paint: Has a gloss of greater than or equal to 70 (using a 60-degree meter). 4. Anti-Corrosive / Rust Preventative Paint: Coating formulated and recommended for use in preventing the corrosion of ferrous metal substrates.
PRIMER	Coating that is formulated and recommended for one or more of the following purposes: to provide a firm bond between the substrate and a subsequent coating; to prevent a subsequent coating from being absorbed into the substrate; to prevent harm to a subsequent coating from materials in the substrate; or to provide a smooth surface for application of a subsequent coating.
REPRODUCTIVE TOXIN	A chemical listed as a reproductive toxin (including developmental, female, and male toxins) by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et. Seq.).
SANDING SEALER	Clear/semi-transparent coating formulated to seal bare wood. Can be abraded to create a smooth surface for subsequent coatings. Does not include sanding sealers that are lacquers (see Clear Wood Finish above).
SEALANT	Any material with adhesive properties, formulated primarily to fill, seal, or waterproof gaps or joints between surfaces. Includes sealant primers and caulks.

SHELLAC	Clear or pigmented coating formulated solely with the resinous secretions of the lac beetle, thinned with alcohol and formulated to dry by evaporation without chemical reaction. Excludes floor applications.
STAIN	Clear semi-transparent/opaque coating formulated to change the color but not conceal the grain pattern or texture of the substrate.
VOLATILE AROMATIC COMPOUND	Any hydrocarbon compound containing one or more 6-carbone benzene rings, and having an initial boiling point less than or equal to 280 degrees Celsius measured at standard conditions of temperature and pressure.
VOLATILE ORGANIC COMPOUND	Any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate) which vaporizes (becomes a gas) and participates in atmospheric photochemical reactions, as specified in Part 51.00 of Chapter 40 of the U.S. Code of Federal Regulations, at normal room temperatures. For the purposes of this specification, formaldehyde and acetaldehyde are considered to be VOCs.
WATERPROOFING SEALER	A coating that prevents the penetration of water into porous substrates.

1.5 GENERAL REQUIREMENTS:

A. The City of New York is committed to implementing good environmental practices and procedures which include achieving a LEED Green building rating. Specific project requirements related to this goal which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor must ensure that the requirements as defined in the sections below and in related sections of the Contract Documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, must not be allowed if such changes compromise the stated environmental goals.

1.6 REFERENCES:

A. Rule 1168 – “Adhesive and Sealant Applications”, amended 7 January 2005): South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov

B. Rule 1113 - “Architectural Coatings”, amended 9 July 2004: South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov

C. Green Seal Standard GS-11- “Paints”, of Green Seal, Inc., Washington, DC, www.greenseal.org

D. Green Seal Standard GC-03- “Anti-Corrosive Paints”, of Green Seal, Inc., Washington, DC, www.greenseal.org

1.7 VOC REQUIREMENTS FOR INTERIOR ADHESIVES, SEALANTS, PAINTS AND COATINGS:

A. GENERAL: Unless otherwise specified herein, the VOC content of all interior adhesives, sealants, paints and coatings (herein referred to as “products”) must not be in excess of **250 grams per liter.**

B. No product may contain any ingredients that are carcinogens, mutagens, reproductive toxins, persistent bioacculmulative compounds, hazardous air pollutants, or ozone-depleting compounds. An exception must be made for titanium dioxide and, for products that are pre-tinted by the manufacturer, carbon black, which must be less than or equal to 1% by weight of the product.

C. No product will contain the following:
1. methylene chloride
2. 1,1,1-trichloroethane
3. benzene
4. toluene
5. ethylbenzene
6. vinyl chloride
7. naphthalene
8. 1,2-dichlorobenzene
9. di (2-ethylhexyl) phthalate
10. butyl benzyl phthalate
11. di-n-butyl phthalate
12. di-n-octyl phthalate
13. diethyl phthalate
14. dimethyl phthalate
15. isophorone
16. antimony
17. cadmium
18. hexavalent chromium
19. lead
20. mercury
21. formaldehyde
22. methyl ethyl ketone
23. methyl isobutyl ketone
24. acrolein
25. acrylonitrile

D. No product will contain more than 1.0% by weight of sum total of volatile aromatic compounds.

1.8 VOC REQUIREMENTS FOR INTERIOR ADHESIVES:

A. The volatile organic compound (VOC) content of adhesives, adhesive bonding primers, or adhesive primers used in this project must not exceed the limits defined in Rule 1168 – "Adhesive and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD), of the State of California.

B. The VOC limits defined by SCAQMD are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.

C. For specified building construction related applications, the allowable VOC content is as follows:

1. Architectural Applications**:**

a.	Indoor carpet adhesive	50
b.	Carpet pad adhesive	50
c.	Wood flooring adhesive	100
d.	Rubber floor adhesive	60
e.	Subfloor adhesive	50
f.	Ceramic tile adhesive	65
g.	VCT and asphalt tile adhesive	50
h.	Drywall and panel adhesive	50
i.	Cove base adhesive	50
j.	Multipurpose construction adhesive	70
k.	Structural glazing adhesive	100

2. Specialty Applications:

a.	PVC welding	510

b.	CPVC welding	490
c.	ABS welding	325
d.	Plastic cement welding	250
e.	Adhesive primer for plastic	550
f.	Contact Adhesive	80
g.	Special Purpose Contact Adhesive	250
h.	Structural Wood Member Adhesive	140
i.	Sheet Applied Rubber Lining Operations	850
j.	Top and Trim Adhesive	250

3. Substrate Specific Applications:

a.	Metal to metal	30
b.	Plastic foams	50
c.	Porous material (except wood)	50
d.	Wood	30
e.	Fiberglass	80

4. Aerosol Adhesives:

a.	General purpose mist spray	65% VOC's by weight
b.	General purpose web spray	55% VOC's by weight
c.	Special purpose aerosol adhesives (all types)	70% VOC's by weight

1.9 VOC REQUIREMENTS FOR INTERIOR SEALANTS:

A. The volatile organic compound (VOC) content of sealants, or sealant primers used in this project must not exceed the limits defined in Rule 1168 – "Adhesive and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD), of the State of California.

B. The VOC limits defined by SCAQMD are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.

1. Sealants:

a.	Architectural	250
b.	Non-membrane roof	300
c.	Roadway	250
d.	Single-ply roof membrane	450
e.	Other	420

2. Sealant Primer:

a.	Architectural – Nonporous	250
b.	Architectural – Porous	775
c.	Other	750

1.10 VOC REQUIREMENTS FOR INTERIOR PAINTS:

A. Paints and Primers: Paints and primers used in non-specialized interior applications (i.e., for wallboard, plaster, wood, metal doors and frames, etc.) must meet the VOC limitations of the Green Seal Paint Standard GS-11, of Green Seal, Inc., Washington, DC. Product-specific environmental requirements are as follows:

1. Volatile Organic Compounds:
   a. The VOC concentrations (in grams per liter) of the product must not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24.

   <u>Interior Paints and Primers</u>:
   Non-flat: 150 g/l

Flat: 50 g/l
The calculation of VOC must exclude water and tinting color added at the point of sale.

B. Anti-Corrosive and Anti-Rust Paints: Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates must meet the VOC limitations of the Green Seal Paint Standard GC-03, of Green Seal, Inc., Washington, DC. Product-specific environmental requirements are as follows:
1. Volatile Organic Compounds:

a. The VOC concentrations (in grams per liter) of the product must not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24.
Anti-Corrosive and Anti-Rust Paints: 250 g/l

The calculation of VOC must exclude water and tinting color added at the point of sale.

1.11 VOC REQUIREMENTS FOR INTERIOR COATINGS:

A. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior must meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.

1.	Clear Wood Finishes:	
	a. Varnish	350
	b. Sanding Sealers	350
	c. Lacquer	550
2.	Shellac:	
	a. Clear	730
	b. Pigmented	550
3.	Stains	250
4.	Floor Coatings	100
5.	Waterproofing Sealers	250
6.	Sanding Sealers	275
7.	Other Sealers	200

The calculation of VOC must exclude water and tinting color added at the point of sale.

1.12 SUBMITTALS:

A. Submit Material Safety Data Sheets, for all applicable products in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets must indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

B. Submit Environmental Building Materials Certification Form (EBMCF) as referenced in Section 01 81 13.03 SUSTAINABLE REQUIREMENTS FOR LEED v3 BUILDINGS: For each field-applied adhesive, sealant, paint, and coating product, provide the VOC requirement, as provided in this Specification, for the relevant material category indicated on the documentation noted above.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13.13

(No Text on This Page)

SECTION 01 81 19
INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 19

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 CONSTRUCTION IAQ MANAGEMENT GOALS FOR THE PROJECT:

A. The City of New York has determined that this Project must minimize the detrimental impacts on Indoor Air Quality (IAQ) resulting from construction activities. Factors that contaminate indoor air, such as dust entering HVAC systems and ductwork, improper storage of materials on-site, and poor housekeeping, must be minimized.

1.3 RELATED SECTIONS:

A. All sections of the Specifications related to interior construction, MEP systems and items affecting indoor air quality.

B. Division 9 (of the Specifications): Finishes.

C. Refer to the Addendum to identify whether this project is designed to comply with a Certification Level according to the U.S. Green Building Council's LEED Rating System, as specified in Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

D. Refer to the Addendum to identify whether this project is designed to comply with Section 01 81 13.13 VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS FOR LEED v3 BUILDINGS.

E. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS.

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

Volatile Organic Compounds (VOCs)	Chemical compounds common in and emitted by many building products, including solvents in paints, coatings, adhesives and sealants, wood preservatives, composite wood binder, and foam insulations. Not all VOCs are harmful, but many of those contained within building products contribute to the formation of smog and may irritate building occupants by their smell or health impact.
Materials that act as “sinks” for VOC contamination	Absorptive materials, typically dry and soft materials (such as textiles, carpeting, acoustical ceiling tiles and gypsum board) that readily absorb VOCs emitted by “source” materials and release them over a prolonged period of time.
Materials that act as “sources” for VOC contamination	Products with high VOC contents that emit VOCs either rapidly during application and curing (typically "wet" products, such as paints, sealants, adhesives, caulks and sealers) or over a prolonged period (typically “dry” products such as flooring coverings with plasticizers and engineered wood with formaldehyde).

1.5 REFERENCES, RESOURCES:

A. “IAQ Guidelines for Occupied Buildings Under Construction”, Second Edition, 2007, The Sheet Metal and Air Conditioner Contractors National Association (SMACNA). (703) 803-2980, www.smacna.org.

B. ANSI/ASHRAE 52.2-2007, “Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size”, www.ashrae.org.

1.6 LEED BUILDING GENERAL REQUIREMENTS:

A. Implement practices and procedures as necessary to meet the Project’s environmental performance goals as set forth in the specific requirements of this section. Specific Project goals that may impact this area of work include: use of recycled-content materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this section, are implemented to the fullest extent. Substitutions or other changes to the work will not be allowed if such changes compromise the stated LEED building performance criteria.

1.7 CONSTRUCTION IAQ MANAGEMENT PLAN:

A. The Contractor must prepare a Construction IAQ Management Plan in coordination with each Subcontractor and submit the Construction IAQ Management Plan to the Commissioner for approval in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. The Construction IAQ Management Plan must meet the following criteria:

1. Construction activities must be planned to meet or exceed the minimum requirements of SMACNA’s “IAQ Guidelines for Occupied Buildings under Construction”, Second Edition, 2007.

2. Absorptive materials must be protected from moisture damage when stored on-site and after installation.

3. The planned operation of air handlers during construction must be described. If air handlers are to be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grille and return or transfer duct inlet opening, such that there is no bypass around the filtration media, as determined by ASHRAE 52.2-2007.

4. Filtration media must be replaced immediately prior to occupancy. Filtration media must have a MERV of 13 as determined by ASHRAE 52.2-2007.

5. A sequence of finish installation plan “Plan” must be developed, highlighting measures to reduce the absorption of VOCs by materials that act as “sinks”.

6. The use of tobacco products is prohibited inside the building and within 25 feet of the building entrance during construction.

7. A flush-out or air testing must be performed.

8. Upon approval of the finish installation plan by the Commissioner, it must be implemented by the Contractor through the duration of the construction process, and documented in accordance with the Submittal Requirements of Sub-Section 1.8 herein.

B. Detailed requirements of the Construction IAQ Management Plan are as follows:

1. SMACNA Guidelines: Chapter 3 of the referenced “IAQ Guidelines for Occupied Buildings Under Construction”, outline IAQ measures in five categories as listed below. The Construction IAQ Management Plan must be organized in accordance with the SMACNA format, and must address measures to be implemented in each of the five categories (including subsections). All subsections must be listed in the Plan; items that are not applicable for this Project should be listed as such.

a. HVAC Protection

1) Protect air handling, distribution equipment and air supply, and return ducting during construction.

2) All ductwork arriving on site will be sealed with plastic sheeting and stored on pallets or dunnage until installed.

3) Cover and protect all exposed air inlets and outlets, openings, grilles, ducts, plenums, etc. to prevent water, moisture, dust and other contaminant intrusion.

4) Apply protection immediately after ducting.

5) Protect ducting runs at the end of day’s work.

6) Inspect temporary filtration weekly and replace as required to maintain the proper ventilation rates in the building.

7) To reduce debris and contamination to mechanical systems, do not store materials in mechanical rooms.

b. Source Control

1) Protect stored on-site or installed absorptive or porous materials. Store materials in dry conditions indoors, under cover, and off the ground or floor.

2) Do not use wet or damaged porous materials in the building. Materials which become contaminated through direct exposure to moisture from precipitation, plumbing leaks, or condensation must be replaced by the Contractor, at no additional cost to the City of New York.

3) Use low-toxicity and low-VOC materials to the greatest extent possible.

4) Recover, isolate, and ventilate containers housing toxic materials and materials with VOC levels above the limits for interior adhesives, sealants, paints, and coatings described in these Specifications.

5) Prevent exhaust fumes from idling vehicles, equipment and fossil-fueled tools from entering the building.

6) Containers housing toxic materials and materials with VOC levels above the limits for interior adhesives, sealants, paints, and coatings described in these Specifications, must be closed when not in use.

7) Enforce the no-smoking job site policy.

c. Pathway Interruption

1) Depressurize work areas which contain dust and odors.

2) Pressurize occupied spaces to prevent intrusion of dust and odors.

3) Erect barriers to contain construction areas.

4) Relocate pollutant sources.

5) Temporarily seal the building and provide 100% outside air for ventilation.

6) Provide walk-off mats at entryways to reduce introduced dirt and pollutants.

7) Use dust guards and collectors on saws and other tools.

d. Housekeeping

1) Store materials on elevated platforms under cover, in a designated dry, clean location, prior to unpacking for installation.

2) If materials are not stored in an enclosed location, cover tops and sides of material with waterproof sheeting, securely tied.

3) Institute cleaning activities to remove contaminants from the building prior to occupancy. Clean all coils, air filters and ductwork prior to performing testing, adjusting and balancing of HVAC systems.

4) Sweep the work area on a daily basis. Use an efficient and effective dust collecting method such as damp cloth, wet mop, or vacuum with high-efficiency particulate filters. Activities which produce high levels of dust must be cleaned up immediately upon completion.

5) Spills or excess applications of products containing solvents, or with VOC levels above the limits for interior adhesives, sealants, paints and coatings described in these Specifications, must be removed immediately.

6) Dust all walls prior to application of finishes.

7) Vacuum all stud tracks prior to application of insulation.

8) Keep materials organized to improve job safety as well as indoor air quality.

e. Scheduling

1) Phase construction such that absorptive materials are installed only in areas that are weathertight.

2) Schedule activities that utilize “sources” of VOC contamination to take place prior to installing high absorbent materials that will act as “sinks” for contaminants.

3) Review of the appropriate components of the Construction IAQ Management Plan must be a regular action topic at weekly site coordination meetings. Implementation of the Plan must be documented in the meeting minutes.

2. Protection of Materials from Moisture Damage: As part of the “Source Control” section of the Construction IAQ Management Plan, measures to prevent installed materials or material stored on-site from moisture damage must be described. This section must also describe corrective measures to be taken if moisture damage does occur to absorptive materials during the course of construction (see Section 1.7 B.1.b).

3. Replacement of Filtration Media: Under the “HVAC Protection” section of the Construction IAQ Management Plan, a description of the filtration media in all ventilation equipment must be provided.

The description must include replacement criteria for filtration media during construction, and confirmation of filtration media replacement for all equipment immediately prior to occupancy.

4. Sequence of Finish Installation for Materials: Where feasible, absorptive materials must be installed after the installation of materials or finishes which have high short-term emissions of VOCs, formaldehyde, particulates, or other air-borne compounds. Absorptive materials include, but are not limited to: carpets; acoustical ceiling panels; fabric wall coverings; insulations (exposed to the airstream); upholstered furnishings; and other woven, fibrous or porous materials. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paints, wood preservatives and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

5. Pre-Occupancy Phase: Perform either a flush-out or air sample testing (Options 1 or 2, respectively), as follows:

   a. OPTION 1 — Flush-Out

      1) Perform flush-out using either Path 1 or Path 2.

         i. Path 1: After construction ends, prior to occupancy and with all interior finishes installed, install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and no higher than 80 degrees F and relative humidity no higher than 60%.

         ii. Path 2: If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it must be ventilated at a minimum rate of 0.30 cfm/sq.ft. of outside air or the design minimum outside air rate determined in IEQ Prerequisite: Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

      2) Commissioning can occur during flush-out, at the discretion of the Commissioner, provided none of the commissioning procedures introduce contaminants into the space and none of the flush-out procedures circumvent the commissioning process. Complete testing and balancing of the HVAC system after the flush-out is complete. Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS.

      3) If even partial construction work occurs during the flush-out, the flush-out must be started again from the beginning for that space. If multiple, discrete HVAC systems operate independently, flush-out may be completed in portions of the building as work is completed in each area served by a given system.

   OR

   b. OPTION 2 — Air Testing

      1) Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with current versions of the United States Environmental Protection Agency “Compendium of Methods for the Determination of Air Pollutants in Indoor Air” or ISO methods, as additionally detailed in the USGBC “LEED BD+C Reference Guide.”

2) Demonstrate that the contaminant maximum concentrations listed below are not exceeded.

CONTAMINANT	MAXIMUM CONCENTRATION
Formaldehyde	27 parts per billion
Particulates (PM10 for all buildings; PM25 for buildings in EPA nonattainment areas, or local equivalent)	PM10: 50 micrograms per cubic meter PM25: 15 micrograms per cubic meter
Ozone (for buildings in EPA nonattainment areas)	0.075 parts per million
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
Target chemicals listed in the California Department of Public Health (CDPH) Standard Method c1.1, Table 4-1, except formaldehyde	CDPH Standard Method v1.1-2010, Allowable Concentrations, Table 4-1
Carbon Monoxide (CO)	9 part per million and no greater than 2 parts per million above outdoor levels

3) The air sample testing must be conducted as follows:

i. All measurements must be conducted prior to occupancy, but during normal occupied hours and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.

ii. The building must have all interior finishes installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are required to be in place for the testing.

iii. Prior to air sample testing, all punch-list items that would generate VOCs or other contaminants, the testing and balancing of the HVAC system and finalization of all cleaning must be completed. Use low-emitting cleaning products and vacuum cleaners with HEPA filtration.

iv. The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points must not be less than one per 25,000 sq.ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.

v. Air samples must be collected between 3 feet and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

vi. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test.

6. Implementation and Coordination: Before Demolition and/or Construction begins, the Contractor must implement the Construction IAQ Management Plan, coordinate the Construction IAQ Management Plan with all affected trades, and designate one individual as the Construction IAQ Representative at no additional cost to the City of New York, who will be responsible for communicating the progress of the Construction IAQ Management Plan with the Commissioner monthly and for assembling the required LEED documentation. Include provisions in the Construction

IAQ Management Plan for addressing conditions in the field that do not adhere to the Plan, including provisions to implement a stop work order or to rectify non-compliant conditions.

a. Distribution: The Contractor must distribute copies of the Construction IAQ Management Plan in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

b. Instruction: The Contractor must provide on-site instruction of appropriate site management to all Contractor's Subcontractors.

c. Monitoring: The Construction IAQ Representative must monitor the implementation of the Construction IAQ Management Plan.

1.8 SUBMITTALS:

A. Submit the following LEED-required records and documents in accordance with Section 01 33 00 SUBMITTAL PROCEDURES and, as applicable, Section 01 81 13.03 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS or Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

B. A copy of the Construction IAQ Management Plan as defined in Sub-Section 1.7 herein.

C. IAQ Tracking Log
   1. Note date of observed major Construction IAQ issues, describe any damage, describe any repairs or maintenance of specific control measures performed and note responsible party.
   2. Note date and findings of weekly site review, describe any repairs or maintenance performed, and note responsible party. Provide date-stamped photographs, inspection reports or other recording processes.
   3. Submit log monthly.

D. Product cut-sheets for all filtration media used during construction and installed immediately prior to occupancy, with MERV values highlighted. Cut sheets must be submitted with the Contactor's or Subcontractor's "approved" stamp as confirmation that the products are the products installed on the Project.

E. PHOTOGRAPHS: Submit to the Commissioner a minimum of 18 photographs as required under the provision for special photographs, in accordance with Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION, comprised of at least six photographs taken on three different occasions during construction of each IAQ measure. The photographs must document the implementation of the Construction IAQ Management Plan throughout the course of the Project construction. Examples include photographs of ductwork sealing and protection, temporary ventilation measures, and conditions of on-site materials storage (to prevent moisture damage). Photographs must include integral date stamping, and must be submitted with brief descriptions of the Construction IAQ Management Plan measure documented, or be referenced to Project meeting minutes or similar Project documents which reference to the Construction IAQ Management Plan measure documented.

F. A copy of the Project's "Testing, Adjusting and Balancing" (TAB) report, if applicable.

1.9 QUALITY ASSURANCE:

A. The Contractor will be responsible for preparing and implementing the Construction IAQ Management Plan and must coordinate and incorporate the work of its Subcontractors in the IAQ Management Plan. Include the Construction IAQ Management Plan requirements in contract agreements with Subcontractors. Familiarize Subcontractors with the Construction IAQ Management Plan and how the Construction IAQ Management Plan will affect their daily activities. Hold a Subcontractors' orientation meeting to review the Construction IAQ Management Plan requirements.

B. Responsibility of Subcontractors: Subcontractors for this Project will be responsible for cooperating with the Contractor in the preparation and implementation of the Construction IAQ Management Plan.

C. Include construction IAQ progress check-ins as a regular item in weekly Subcontractor meetings and safety meetings. Provide a copy of the plan on site, posted in an easily accessible area.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 19

SECTION 01 81 21

SUSTAINABLE CONSTRUCTION REQUIREMENTS

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 81 21

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

A. Section includes general requirements for sustainable construction.

1.3 DEFINITIONS

A. Embodied carbon: The greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.

B. Environmental Product Declaration (EPD): A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

1.4 SUBMITTALS

A. EPDs: The Contractor must submit to the Commissioner copies of all EPD's submitted to the Building Transparency database per Subsection 1.5.C.

B. Low emission vehicles and equipment: The Contractor must submit to the Commissioner a log of all internal combustion engine (ICE) powered equipment used on the Project. The log must be submitted at Substantial Completion, and include:

a. The type of equipment (generator, excavator, crane, light tower, air compressor, etc.),
b. The fuel used by the ICE,
c. The engine size in horsepower (HP), and
d. If the equipment was provided by a subcontractor, which one.

1.5 ENVIRONMENTAL PRODUCT DECLARATIONS

A. EPDs are required for the following materials, if used:

1. Steel materials:

a. 05 12 00 Structural steel framing

b. 05 12 13 Architecturally exposed structural steel framing

c. 05 21 00 Steel joist framing

d. 05 31 00 Steel decking

e. 05 40 00 Cold-formed metal framing

f. 05 44 00 Cold formed metal trusses

2. Concrete materials:

a. 03 30 00 Cast-in-place concrete

b. 03 38 16 Unbonded post-tensioned concrete

c. 03 41 00 Precast structural concrete

d. 03 45 00 Precast architectural concrete

e. 03 47 13 Tilt-up concrete

B. If EPDs are available for materials not listed in subsection 1.5.A, they must be submitted.

C. EPDs must be submitted to the Building Transparency database, using the OpenEPD format, at https://buildingtransparency.org/ec3

1.6 LOW-EMISSION VEHICLES AND EQUIPMENT

A. The Contractor must endeavor to minimize the greenhouse gas emissions from the Contractor's equipment. To achieve this goal, the following is required:

1. Electric powered equipment is to be used where practical instead of internal combustion engine (ICE) powered equipment. The Contractor may refer to the NYC Department of Citywide Administrative Services (NYC DCAS) bi-annual publication, the Clean Fleet Transition Plan (https://www1.nyc.gov/site/dcas/agencies/fleet-sustainability.page), in order to determine what equipment is available.

2. Where ICE powered equipment is necessary, efforts should be taken to ensure the most efficient ICE engines are used. This may include:

a. The use of larger efficient ICE generators to power multiple pieces of electric equipment,
b. Reductions in the use of less than 50HP engines,
c. Use of lower emission or renewable fuels, such as biodiesel or CNG,
d. Use of hybrid electric equipment, and
e. Other innovative methods proposed by the Contractor.

3. The Contractor is required to coordinate between all subcontractors and trades in order to reduce the number of ICE equipment and generators in use.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

END OF SECTION 01 81 21

(No Text on This Page)

SECTION 01 91 13
GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 91 13

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. The OPR and BOD documents are included by reference for information only.

C. The Commissioning Plan, prepared by the Commissioning Agent (CxA) under separate contract with the City of New York, contains requirements that apply to this section.

1.2 SUMMARY:

A. This section includes general requirements that apply to implementation of Commissioning without regard to systems, subsystems and equipment being commissioned. General Requirements for building enclosure commissioning are addressed in a separate specification.

B. This Section includes:
1. Definitions
2. Commissioning Team
3. City's Responsibilities
4. Contractor's Responsibilities
5. CxA Responsibilities
6. Commissioning Documentation
7. Submittals
8. Coordination
9. Execution

1.3 RELATED SECTIONS:

A. System-Specific Commissioning requirements indicated in other sections of the Project Specifications for specific requirements for commissioning systems.

B. This Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED procedures, and specific commissioning requirements of the Project Specifications, whichever is more stringent. The Contractor must cooperate with the CxA and provide whatever assistance is required.

C. Related sections include, without limitation, the following:

1.	Section 01 10 00	SUMMARY
2.	Section 01 31 00	PROJECT MANAGEMENT AND COORDINATION
3.	Section 01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
4.	Section 01 78 39	CONTRACT RECORD DOCUMENTS
5.	Section 01 79 00	DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION
6.	Section 01 81 13.03	SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v3 BUILDINGS
7.	Section 01 81 13.04	SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS
8.	Section 01 91 15	GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Basis of Design (BOD)	A document, prepared by the Design Consultant, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
Checklists	Forms that outline the step-by-step process that must be executed to fulfill the test requirements and to verify that materials, equipment, assemblies and systems are installed in accordance with the Contract Documents. The CxA must develop the checklists; the Contractor must complete them.
Commissioning	Commissioning is a systematic process of ensuring and documenting that the building systems have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The process does not eliminate or reduce the responsibility of the installing subcontractors to provide a finished product.
Commissioning Agent (Aka Commissioning Authority) (CxA)	Consultant under separate contract with the City of New York to provide Commissioning services for this Project. The CxA must not be an employee of the Contractor, nor will the CxA have any interest in the Contract.
Commissioning Plan	A document developed by the CxA that outlines the organization, schedule, roles and responsibilities, allocation of resources, and documentation requirements of the commissioning process.
Deferred Performance Tests	Performance tests that are performed, at the discretion of the CxA, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design, or other site conditions that disallow the test from being performed.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and Specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Factory Testing	Testing of equipment on-site or at the factory, by factory personnel, with or without the City’s representative.
Functional Performance Test (FPT)	Functional performance testing includes the dynamic functions and operations of equipment and systems using manual or monitoring methods under various levels of operation. Systems are tested under various modes, such as during low cooling loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarms, power failure, etc. The systems are run through all the control system’s sequences of operation and components are verified to respond as the sequences state. Such tests must be performed as per the protocol written by the CxA which defines the methods, personnel and expectations.
Issue (or Deficiency)	A condition in the installation or function of a component, piece of equipment, or system that is not in compliance with the Contract Documents.

Issues Log	A formal and ongoing record of problems, deficiencies or concerns that have been raised by members of the Commissioning Team during the course of commissioning. The Issues Log is the primary tracking tool to address all Commissioning Issues by concerned parties. All Issues must be addressed and resolved by the concerned parties before the closeout of the Project. This log tracks the resolution performed and date of closure of each Issue.
Master Equipment List (MEL)	A complete listing of all commissioned building equipment, including details such as make, model, location, ID Tag number, etc. that is taken from submittals and is the basis from which checklists will be generated. The MEL is a spreadsheet which is also used as a tracking tool for all milestones of the commissioning process, such as the creation and performance of checklists, startup of equipment, TAB work, etc.
Monitoring	The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.
Owner (City of New York) Contracted Tests	Tests paid for by the City of New York outside of the Contractor's Contract and for which the CxA does not provide oversight. These tests will not be repeated during functional testing if properly documented.
Owner's Project Requirements (OPR)	A document, prepared by the Design Consultant that details the functional requirements of a Project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
Pre-functional (Installation) Checklists	A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CxA to the Contractor. Installation checklists are primarily static inspections and procedures to prepare equipment or systems for initial operation. Pre-functional (Installation) checklists augment, and are combined with, the manufacturer's startup checklist. The Checklists are filled out by the Contractor and reviewed by the CxA.
Sampling	Functional testing for a percentage of the total number of identical or near-identical pieces of equipment.
Seasonal Performance Tests	Functional tests that are deferred until, or performed again when, the system(s) will experience climate conditions close to their design conditions.
Startup	The initial starting or activating of equipment, including executing construction checklists.
Systems, Subsystems, Equipment, and Components	Where these terms are used together or separately, they mean "as-built" systems, subsystems, equipment, and components.
Systems Manual	A system-focused composite document that includes the Operation and Maintenance Manual, and additional information of use to the owner during the occupancy and operations phase.
Testing, Adjusting and Balancing (TAB)	Testing, adjusting, and balancing of the Heating Hot Water (HHW), Chilled Water (CHW) and Heating, Cooling, and Ventilation Airflow distribution system flows and pressures as specified in Contract Documents by a subcontractor certified to perform such work.
Test Requirements	Requirements specifying what modes and functions, etc. must be tested on any given piece of equipment or any given system (integrated or standalone). The test requirements are not the detailed test procedures. The test requirements for each system are specified in the respective Contract Documents.

Trending	Monitoring using the building controls system, and analysis of the data gathered over a period of time.

1.5 COMMISSIONING TEAM:

A. Members Appointed by the Contractor and its Subcontractors: Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the Commissioning process through coordinated actions. The Commissioning Team will consist of, but not be limited to, representatives of the Contractor, including Project superintendent and Subcontractors, installers, suppliers and specialists deemed appropriate by the CxA.

B. Members Appointed by the City:

1. Commissioning Authority/Agent (CxA): The designated person, company, or entity under separate Contract with the City that plans, schedules and coordinates the Commissioning Team to implement the commissioning process.

2. Representatives of the facility user and operation and maintenance personnel.

3. Design Consultant and other concerned entities.

1.6 CITY'S RESPONSIBILITIES:

A. Provide the OPR and BOD documentation to the CxA for use in developing the Commissioning Plan; systems manual; operation and maintenance orientation plan; and testing plans and checklists.

B. Assign operation and maintenance personnel to participate in Commissioning Team activities.

C. Provide full details and results of any Owner- contracted tests relevant to the current Project.

1.7 CONTRACTOR'S RESPONSIBILITIES:

A. The Contractor must provide utility services required for the commissioning process.

B. As a member of the Commissioning Team, the Contractor and Subcontractors must assign representatives with expertise and authority to act on behalf of the Contractor and its Subcontractor and schedule them to participate in and perform Commissioning Team activities including, but not limited to, the following:

1. Participate in scheduled construction-phase coordination and Commissioning Team meetings.

2. Integrate and coordinate commissioning process activities with the construction schedule.

3. Provide all factory acceptance test reports to the CxA through the Commissioner.

4. Respond to any additional specific information requests from the CxA. CxA may request additional documentation necessary for the commissioning process. Requests by CxA may precede, be concurrent with, or follow normal submittals.

5. Ensure the cooperation and participation of all Subcontractors and manufacturers of equipment to be commissioned.

6. Verify and confirm that components, equipment, and system are functioning as per design prior to CxA witnessing testing.

7. Perform testing required in the Commissioning schedule as per the Commissioning process test procedures provided by the CxA, providing no less than 48 hours' notice to the CxA through the Commissioner.

8. Complete installation checklists as Work is completed and return to CxA through the Commissioner.

9. Provide written responses to the CxA through the Commissioner for resolution of Issues recorded in the Issues Log within five (5) business days.

10. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

11. Submit operation and maintenance manuals for systems and subsystems, and equipment in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS. Such documents must be submitted prior to functional testing.

12. Submit As-Built documents in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.

13. Provide orientation sessions for operations and maintenance personnel (sessions will be witnessed by the CxA) in accordance with Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION. Provide no less than 48 hours' notice to the CxA, through the Commissioner. Video record and edit orientation sessions and provide an electronic recording to the CxA and Commissioner no later than two (2) weeks after the orientation session occurs. Edit as requested by the Commissioner.

1.8 COMMISSIONING AGENT'S (CxA) RESPONSIBILITIES:

A. Organize and lead the Commissioning Team.

B. Prepare a construction-phase Commissioning Plan. Collaborate through the Commissioner with each Contractor and with Subcontractors to develop test and inspection procedures. Include design changes and coordinate Commissioning activities with the overall Project schedule. Identify Commissioning Team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task. Update the Commissioning Plan during construction as required.

C. Review and comment in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, on submittals from the Contractor for compliance with the OPR, BOD, Contract Documents, and construction-phase Commissioning Plan. Review and comment on performance expectations of systems and equipment and interface between systems relating to the OPR and BOD.

D. Coordinate with the Commissioner, in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION, to convene Commissioning Team meetings for the purpose of coordination, communication and conflict resolution; discuss progress of the commissioning processes.

E. At the beginning of the construction phase, coordinate with the Commissioner's kick-off meeting schedule to conduct an initial construction-phase coordination meeting for the purpose of reviewing the Commissioning activities and establishing tentative schedules for operation and maintenance submittals, operation and maintenance orientation sessions, TAB Work, testing, and Project completion.

F. Perform site visits to observe and inspect construction as described in the Commissioning Plan. Report progress and deficiencies to the Commissioner. In addition to compliance with the OPR, BOD, and Contract Documents, inspect systems and equipment installation for adequate accessibility required for component maintenance replacement and repair.

G. Prepare and distribute project-specific test and inspection procedures and checklists and maintain MEL.

H. Verify air and water systems balancing by sampling, reviewing completed reports and selected site observation. Coordinate submittal reviews with the Commissioner so that the comments are combined into a single review and submitted to the Contractor.

I. Coordinate with the Commissioner to witness and document tests, inspections and systems startup, as per the Commissioning Plan.

J. Maintain an Issues Log and a record of functional testing. Report all Issues as they occur to the Commissioner.

K. Compile test data, inspection reports and certificates, and include them in the systems manual and Commissioning Report.

L. Certify date of acceptance and startup for each item of equipment for start of warranty periods.

M. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BOD, and Contract Documents. Operation and maintenance documentation requirements are specified in other sections of the Project Specifications and described in Section 01 78 39 CONTRACT RECORD DOCUMENTS.

N. Review agenda for orientation; witness and confirm orientation session conforms with agenda and Contract Documents; review recording of demonstration and orientation sessions provided by the Contractor on USB drive or other electronic media as requested by the Commissioner and provide appropriate comments for editing.

O. Return to the site ten (10) months into the twelve (12)-month guaranty period, to review with facility staff the current building operation and the condition of outstanding Issues related to the original and seasonal commissioning. Interview facility staff and identify problems or concerns they have with operating the building as originally intended.

P. Prepare Commissioning Reports.

Q. Assemble the final commissioning documentation, including the Commissioning Report and Systems Manual.

R. Perform all CxA tasks as defined by LEED and the NYC Energy Conservation Code; prepare LEED submittal documents and preliminary and final Commissioning Reports as required by the NYC Energy Conservation Code.

1.9 COMMISSIONING DOCUMENTATION:

The Contractor must assist the CxA in the development and compiling of the following Commissioning Documentation:

A. Index of Commissioning Documents: The CxA will prepare an index including the storage location of each document.

B. Commissioning Plan: A document prepared by the CxA that outlines the schedule, allocation of resources, roles and responsibilities, and documentation requirements of the Commissioning process. Within 30 days of receipt of the Commissioning Plan, the Contractor must review the plan and document any issues or concerns with RFI's in compliance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION.

C. Test Checklists: The CxA will develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. The CxA will prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Space will be provided for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in other sections of the Project Specifications, but must include without limitation:

1. Identification of tested item
2. Date of test
3. Indication of whether the record is for a first test or retest following correction of a problem or Issue
4. Dated signatures of the person performing the test and of the witness if applicable

5. Deficiencies and Issues, if any, generated as a result of the test

D. Inspection Checklists will be signed by the Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing.

E. Test and Inspection Reports: The CxA will record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application will be included with data. CxA must compile test and inspection reports and test and inspection certificates and include them in systems manual and Commissioning Report.

F. Corrective Action Documents: The CxA will document corrective action taken for systems and equipment that fail tests and include required modifications to systems and equipment and revisions to test procedures, if any. The Contractor must retest systems and equipment requiring corrective action. The CxA will document retest results.

G. Issues Log: The CxA will prepare and maintain an Issues Log that describes design, installation, and performance Issues that are at variance with the OPR, BOD, and Contract Documents. The log will identify and track Issues as they are encountered, documenting the status of unresolved and resolved Issues. The Issues Log will identify, at a minimum:

1. The party responsible for correcting the Issue,
2. The person documenting the Issue resolution,
3. The exact location of the Issue (floor and room),
4. The applicable system component,
5. A detailed description of the Issue,
6. The Issue status, and
7. The date the Issue was discovered and the date the Issue was resolved.

H. Commissioning Report: The CxA will document results of the commissioning process including unresolved Issues and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR, BOD, and Contract Documents. The Commissioning Report must include:

1. An executive summary, including participants and their roles, a brief building description, an overview of the commissioning and testing scope, and a general description of testing and verification methods,
2. Installation/Pre-Functional Checklists,
3. Start-up reports,
4. Functional Test documentation,
5. Trend Log Analysis,
6. The final Issues Log, with all Issues identified through the commissioning process, identifying which, if any, Issues remain unresolved,
7. The Commissioning Plan,
8. Commissioning progress and field reports,
9. Commissioning review documents, and
10. Record of owner’s orientation.

I. Systems Manual: The CxA will gather required information and compile systems manual as specified in other sections of the Project Specifications and described in Section 01 78 39 CONTRACT RECORD DOCUMENTS.

1.10 SUBMITTALS:

A. Submittal of shop drawings, product data, samples, etc., relevant to commissioning must be provided to the CxA as requested. Such submittals must be in compliance with Section 01 33 00 SUBMITTAL PROCEDURES.

B. As-Built Contract Record Drawings and Operating and Maintenance Manuals relevant to commissioning must be provided to the CxA as requested. Such submittals must be in compliance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.

C. All demonstration and orientation submittals relevant to commissioning must be provided to the CxA as requested. Such submittals must be in compliance with Section 01 79 00 DEMONSTRATION AND OWNER'S PREACCEPTANCE ORIENTATION.

D. Completed Prefunctional (Installation) Checklists must be provided to the CxA prior to equipment startup.

1.11 COORDINATION:

A. Coordination of Commissioning is the responsibility of all Commissioning Team members.

B. Coordinating Meetings: The CxA will coordinate with the Commissioner's regularly scheduled construction progress meetings to conduct coordination meetings of the Commissioning Team to review progress on the Commissioning Plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities. Commissioner and Contractor must ensure that all required Commissioning Team members attend.

C. Construction Documents: The Contractor, through the Commissioner, will furnish copies of all construction documents, addenda, change orders and appropriate submittals and shop drawings to the CxA.

D. Pre-testing Meetings: The CxA will coordinate with the Commissioner to conduct pretest meetings of the Commissioning Team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested. Commissioner and Contractor must ensure that all required Commissioning Team members attend.

E. Testing Coordination: Contractor must coordinate schedule times with the Commissioning Team, through the Commissioner, for tests, inspections, obtaining samples, and similar activities. The CxA will advise the Commissioning Team as to the sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

F. Manufacturers' Field Services: The Contractor must coordinate manufacturers' field services, as per the Commissioning Plan.

G. The CxA will regularly apprise the Commissioner of progress, pending problems and/or disputes, as well as provide regular status reports on progress with each system.

PART II – PRODUCTS

2.1 TEST EQUIPMENT

A. All industry standard test equipment required for performing the specific tests must be provided by the Contractor responsible for testing. Any proprietary Vendor-specific test equipment must be provided by that Vendor or Manufacturer.

B. Special equipment, tools, instruments, software, and equipment communication network access hardware and software (only available from Vendor, specific to the piece of equipment) required for testing equipment according to the Contract Documents must be included at no extra cost to the City and must be turned over to the City at Project close-out, except for stand-alone data logging equipment that may be used by the CxA.

C. Any portable or handheld setup and/or calibration devices required to initialize the control system must be made available by the control vendor for use by the CxA at no additional cost to the City.

D. The instrumentation used in the commissioning process must comply with the following:

1. Be of sufficient quality and accuracy to test and/or measure system performance within the tolerances required

2. Be calibrated at the manufacturer's recommended intervals with calibration tags permanently affixed to the instrument

3. Be maintained in good repair and operating condition throughout use duration on this Project

4. Be immediately recalibrated or repaired if dropped and/or damaged in any way during this Project.

PART III – EXECUTION

3.1 COMMISSIONING PROCESS

A. The following provides an overview of the Commissioning tasks during Project construction and the general order in which they occur.

1. Construction-phase Commissioning begins with a Commissioning Kickoff Meeting, conducted by the CxA through the Commissioner in accordance with section 01 31 00 PROJECT MANAGEMENT AND COORDINATION, where the Commissioning process is reviewed with all the Commissioning Team Members.

2. Additional meetings may be required throughout construction, scheduled by the CxA through the Commissioner in accordance with 01 31 00 PROJECT MANAGEMENT AND COORDINATION with necessary parties attending, to plan, scope, coordinate and schedule future activities and resolve open Issues.

3. The CxA will review the Contractor submittals concurrent with the Commissioner and provide comments to the Commissioner for inclusion in their review. The reviewed submittals will include all commissioned equipment information, including detailed startup procedures, and coordination drawings that include commissioned equipment and systems, control drawings and sequences, and interfaces and interlocks between systems.

4. The CxA works with the Commissioner and Contractor in developing Pre-functional and Functional Test documentation formats.

5. Periodically throughout the construction process, the CxA will perform site visits to observe component and system installations.

6. The checkout and performance verification generally proceeds from component level to equipment to systems and intersystem levels. Pre-functional (Installation) Checklists are to be completed before equipment startup. Equipment startup must be completed before TAB. TAB must be completed before the Functional Performance Checklists.

7. The Contractor must, with guidance from the CxA, execute and document the Pre-Functional (Installation) Checklists and perform startup and initial checkout of equipment and systems. The CxA documents that the checklists and startup are completed according to the approved plans.

This will include the CxA witnessing selected assembly markups, portions of the startup of selected equipment, and spot checking the Pre-Functional (Installation) Checklists.

8. The CxA develops specific equipment and system Functional Checklists. The Contractor receives a copy of the procedure through the Commissioner. The CxA may request additional design narrative from the Commissioner and Controls Contractor, depending on the completeness of the Basis of Design and sequences provided within the design documents.

9. The Functional Checklists are executed by the Contractor and witnessed and documented by the CxA.

10. Items of non-compliance in material, installation startup, and operation are corrected and the equipment or system is rechecked. The CxA will maintain an Issues Log to track Issues and Issue resolution.

11. The CxA will review the Operation & Maintenance documentation for completeness.

12. Commissioning, excluding the Warranty Walkthrough and any seasonal testing at the written direction of the Commissioner, must be completed prior to Substantial Completion.

13. The CxA reviews the orientation documentation. The orientation schedules and agenda are provided by the subcontractors. The CxA verifies that orientation is completed, attended by the appropriate City of New York personnel, is thorough and provides all necessary information required to operate and service the equipment or system.

14. Deferred testing/checkouts are conducted, as specified or required in the Contract Documents.

3.2 COMMISSIONING PLAN AND SCHEDULE

A. Commissioning Plan: The Commissioning Plan provides guidance in the execution of the commissioning process. After the initial construction phase Commissioning kickoff meeting, the CxA will update the plan. This plan is a living document that must evolve and expand as the Project progresses. The Commissioning Plan must include:

1. Description of the facility and Project.
2. Description of the commissioning process and associated deliverable documents.
3. Description of equipment and systems to be commissioned.
4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
5. Sample rates for equipment to be tested.
6. Identification of task items that must be completed before the next operation can proceed.
7. Description of responsibilities of Commissioning Team members.
8. Description of observations to be made and reported on during testing and witnessing of testing by all parties involved in the Project.

B. Commissioning Schedule: Contractor must provide construction schedules to the CxA, in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION. The CxA will develop and submit a schedule identifying the commissioning process and provide commissioning scheduling information to the Commissioner and Contractor for review and planning activities. The Contractor must incorporate the CxA's activities into the Project schedule.

3.3 TESTING PROCEDURES

A. The CxA will determine and document the acceptance procedures for each system within disciplines. The acceptance procedures must incorporate the commissioning standards and successful testing results as referred to throughout the Specifications.

B. The CxA will provide performance checklists and performance checkout data sheets for each system based on actual system configuration. Special emphasis must be placed on checkout procedures that must conclusively determine actual system performance and compliance with the OPR and BoD.

C. The Contractor and appropriate Vendor(s) must be informed of what tests are to be performed and the expected results. The Commissioning Plan must address the test requirements and be distributed to all parties involved with that system.

D. Prior to Functional Testing, the Contractor must provide the following:

1. Contractor must certify in writing that commissioned systems, subsystems, and equipment have been installed, calibrated and started, and are operating according to the Contract Documents.

2. Contractor must certify in writing that all relevant instrumentation and control systems have been completed and calibrated; are operating according to the Contract Documents; and that pretest set points have been recorded.

3. Contractor must certify in writing that TAB procedures have been completed, and that the TAB report has been submitted, discrepancies corrected, and corrective work approved.

4. Contractor must perform tests for system and intersystem performance only after CxA and Commissioner have approved the completed testing checklists for systems, subsystems, and equipment.

E. The Functional Performance tests must be performed by the Contractor and Vendor(s) with oversight by the CxA. The CxA must witness, verify, and document these tests.

1. Functional Performance Tests must include operating the systems and components through each of the written sequences of operation, other significant modes of miscellaneous alarms, power failure, and security alarm when impacted by and interlocked with commissioned equipment, as detailed in the Commissioning Plan.

2. Checklists must be completed comprehensively and to the extent necessary to enable the CxA to assure the Commissioner that the systems perform as per the OPR, BOD, and Contract Documents.

3. If a test is failed for any reason and retesting is required, the Contractor must provide retesting at no additional cost to the City.

4. If a test must be witnessed more than twice by the Commissioning Agent due to repeated failure to perform as per the design documents, the Contractor must be responsible for the Commissioning Agent’s fee for witnessing repeated tests beyond the second incidence. Such fee will be negotiated between the Commissioning Agent and the Commissioner.

5. After testing, Contractor must return settings to normal operating conditions.

3.4 OPERATION & MAINTENANCE MANUALS

A. General

1. The CxA must review the Operation & Maintenance manuals provided by the Contractor for completeness of the document. The review process will verify that Operation & Maintenance

instructions meet Specifications and are included for all commissioned equipment furnished by the Contractor.

2. Published literature will be specifically oriented to the provided equipment, indicating required operation and maintenance procedures, parts lists, assembly / disassembly diagrams and related information.

3. The Contractor must incorporate the standard technical literature into system-specific formats for this facility as designed and as actually installed. The resulting Operation & Maintenance information must be system-specific, concise, to the point and tailored specifically to this facility. The CxA must review these documents as necessary for final corrections by the Contractor.

4. Contractor must submit Operations & Maintenance Manuals for each piece of equipment for review no later than 45 days after submittal approval.

B. The Operation & Maintenance Manual review and coordination efforts must be completed prior to Owner orientation sessions, as these documents are to be utilized in the orientation sessions.

C. System Operations Manual

1. The CxA must prepare and deliver these documents with inputs from the Contractor. The Contractor must provide all required documents to the CxA, through the Commissioner. The required documents must be described in the Commissioning Plan and Contract Documents. Typically, the manual includes the following:

   a. System, subsystem, and equipment descriptions
   b. Commissioned systems single line diagrams (to be provided by Mechanical, Electrical, Plumbing, and Building Management System (BMS) subcontractors).
   c. As built sequences of operations, control drawings and original set points (to be provided by Design Consultant and BMS subcontractor).
   d. Operating instructions for integrated building systems (to be provided by Mechanical and BMS subcontractors).
   e. Recommended schedule of maintenance requirements and frequency (to be provided by subcontractors).
   f. Recommended schedule for calibrating sensors and actuators (to be provided by BMS subcontractor).

3.5 DEMONSTRATION AND INSTRUCTION

A. The Contractor must schedule and coordinate instruction sessions for the facility's staff for each commissioned system. Demonstrations must be held per Contract Documents, along with the appropriate schematics, handouts and visual / audio orientation aids onsite with equipment.

B. The equipment vendors must provide instruction on the specifics of each major equipment item including philosophy, troubleshooting and repair techniques.

C. The Contractor must record and edit demonstration and orientation sessions, and provide these records to the CxA, through the Commissioner.

D. For additional direction pertinent to instruction, refer to other specific divisions for demonstration and instruction requirements.

3.6 WARRANTY REVIEW / SEASONAL TESTING

A. The CxA will return upon the start of the new season (cooling or heating) after Project completion to conduct performance tests that could not be performed due to ambient conditions. The seasonal testing will only be performed if suitable loads / conditions were unavailable during the performance testing stages (in other words; the requirement for testing is warranted), and at the written direction of the Commissioner.

B. The CxA will return to the site approximately ten (10) months into the twelve (12)-month guaranty period and interview the occupants and maintenance staff, review the operation of the building, provide recommendations for installation and operational problems and document warranty and operational Issues in the Issues database.

3.7 RECORD DRAWINGS

A. The CxA must review the as built Contract Documents to verify incorporation of both design changes and as-built construction details. Discrepancies noted must be corrected by the appropriate party.

END OF SECTION 01 91 13

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SECTION 01 91 15
GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 91 15

PART I – GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. The Owner's Project Requirements (OPR) and Basis of Design (BOD) documents are included by reference for information only.

C. The Commissioning Plan, prepared by the Commissioning Agent (CxA) under separate contract with the City of New York, contains requirements that apply to this section.

1.2 SECTION INCLUDES

A. This section includes the commissioning requirements for the Building Enclosure systems. Refer to "Exterior Enclosure Commissioning" in other sections of the Project Specifications for specific requirements regarding Building Enclosure Commissioning.

1. The commissioning requirements for the Building Enclosure systems given in this section are entirely separate from, and in addition to, the Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for this Project. The Contractor, and his/her Suppliers, Subcontractors, Vendors, etc., are required to participate in both commissioning processes as required.

1.3 DESCRIPTION

A. Building Enclosure Commissioning (BECx) is a systematic process of ensuring all building enclosure systems responsible for environmental separation perform as per the OPR and BOD. The BECx process is intended to verify and document proper installation and performance of building enclosure materials and systems in accordance with the Contract Documents.

B. Commissioning does not take away from, or reduce, the Contractor's responsibility to provide a finished and fully functioning product and installation.

C. This section will in no way diminish the responsibility of the Contractor in performing all aspects of work and testing as outlined in the Contract Documents. Any requirements outlined in this section are in addition to requirements outlined in the Contract Drawings and Specifications.

1.4 RELATED WORK

A. Specific BECx requirements are given in this Section. The following Project Specification sections are related to the commissioning work specified in this section:

1. Basic Concrete Requirements: Refer to Division 03
2. Basic Metal Requirements: Refer to Division 05
3. Basic Waterproofing, Roofing, Air Barrier and Insulation Requirements: Refer to Division 07
4. Basic Fenestrations Requirements: Refer to Division 08
5. Basic Finishing Requirements: Refer to Division 09

1.5 DEFINITIONS AND ABBREVIATIONS

A. Refer to Article 2 of the Contract and Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for terms, words, and expressions not otherwise defined herein.

Approval	Acceptance that a material or system has been properly installed and is functioning in tested modes according to the Contract Documents.
Building Enclosure Commissioning Agent (BECA)	BECA directs and coordinates day-to-day BECx commissioning activities.
Building Enclosure Testing Agency (BETA)	Building Enclosure Testing Agency whom is an independent agency retained by the Contractor and approved by the Commissioner, fully accredited by the appropriate governing body for each of the materials, components or systems to be tested or evaluated for compliance with requirements of the Contract Documents and as directed by the BECA. Documentation of such certification must be submitted to and approved by the Commissioner prior to the start of any work by the BETA.
Commissioning	Commissioning is a systematic process of ensuring and documenting that the building systems have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent, and have documentation to support proper installation and operation. The process does not eliminate or reduce the responsibility of the installing subcontractors to provide a finished product.
Commissioning Agent (CxA)	Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for Definition.
Commissioning Plan	Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for Definition.
Deficiency	Condition of a building enclosure material or system that is not in compliance with Contract Documents (that is, does not perform properly or does not comply with design intent).
Design Consultant	Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for Definition.
Simulated Condition	Condition created for testing component or system (e.g., applying pressure differential across the building enclosure concurrent with water spray to simulate a wind driven rain).
Mock-up	The activities where systems or materials are initially constructed and tested.

1.6 COORDINATION

A. Building Enclosure Commissioning Team: Members of the Building Enclosure Commissioning Team will consist of:

1. CxA
2. BECA
3. BETA
4. Commissioner
5. Contractor, and all Building Enclosure Subcontractors
6. Design Consultant

B. Management: City of New York will contract services of the BECA through a separate contract. The BECA will direct and coordinate commissioning activities and report to the Commissioner. All members of the

Building Enclosure Commissioning Team must cooperate to fulfill contracted responsibilities and objectives of the Contract Documents.

C. Scheduling: BECA must work with the Building Enclosure Commissioning Team to establish required commissioning activities to incorporate into the preliminary commissioning schedule. The Contractor must integrate commissioning activities into master construction schedule, in accordance with Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION. Necessary notifications are to be made in a timely manner in order to expedite commissioning.

1.7 SUBMITTALS

A. Contractor must provide documentation required for commissioning work in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. At minimum, documentation must include, but not be limited to:

1. Submittal of shop drawings, product data, samples, etc., relevant to BECx and as requested by the BECA. Such submittals must be in compliance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
2. As-Built Record Drawings and Operation and Maintenance Information relevant to BECx and as required by the BECA. Such submittals must be in compliance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
3. All demonstration and orientation submittals relevant to BECx and as requested by the BECA. Such submittals must be in compliance with Section 01 79 00 DEMONSTRATION AND OWNER'S PREACCEPTANCE ORIENTATION.
4. Performance data, any performance test procedures, and installation and checkout materials.

B. The Contractor must provide all submittals to the Design Consultant, as per Section 01 33 00 SUBMITTAL PROCEDURES. The Design Consultant will transmit all building enclosure related submittals to the BECA for concurrent review.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 SYSTEMS TO BE COMMISSIONED

A. Building Enclosure systems to be commissioned may include, but are not limited to, Roof waterproofing, including garden roof systems, all penetrations, and transitions; skylights and other sloped glazing; exterior walls, including the air barrier system, water management systems, and thermal insulation; punched windows, window walls, curtain walls, storefronts, glazed entries, doors, and louvers; sealants, expansion joints, and control joints; flashings, including all transitions and end-dams; terrace, balcony, and deck waterproofing; below-grade waterproofing, including drainage, waterproofing and damp proofing; below slab floor barriers; interface and transition conditions between exterior enclosure components and systems; smoke controls and fire separation and stopping; and any other special building enclosure systems, equipment, and controls. Refer to the Contract Documents for clarity.

3.2 RESPONSIBILITIES OF COMMISSIONING TEAM MEMBERS DURING CONSTRUCTION PHASE

A. Responsibilities of the Design Consultant include without limitation the following:

1. Review BECA comments on construction documents and shop drawings.
2. Assist in dispute resolution regarding building enclosure items.
3. Review BECA reports.
4. Incorporate BECA Submittal Review Comments into response on submittals.

B. Responsibilities of the BECA include the following without limitation:

1. Review and comment on Mock-up construction and testing plan as provided by Contractor.
2. Development of BECx Plan.
3. Review of building enclosure shop drawings and submittals, including “approved equal” requests, through the Commissioner in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
4. Attend combined pre-construction and BECx kick-off meeting.
5. Develop construction checklists for the building enclosure for the Contractor’s use.
6. Observe the construction of a building enclosure Mock-up.
7. Witness the testing of a building enclosure Mock-up.
8. Project meetings / conference calls / coordination.
9. Field monitor installation of exterior enclosure components.
10. Update field report log.
11. Update BECx Plan.
12. Advise on Requests for Information.
13. Assist with the preparation of LEED paperwork.
14. Prepare systems manual, with required inputs and documentation from the Contractor in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
15. Complete Maintenance Plan, with required inputs and documentation from the Contractor in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
16. Prepare training manual, with required inputs and documentation from the Contractor in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
17. Prepare final BECx record and enclosure commissioning close-out documents.
18. Develop on-going BECx Plan.

C. Responsibilities of the Contractor and Building Enclosure Subcontractors include without limitation the following:

1. Review BECx Plan and FPT specification.
2. Attend commissioning kick-off meeting and other Building Enclosure Commissioning Team meetings.
3. Incorporate commissioning activities into the construction schedule.
4. Periodically update Commissioning activities in the construction schedule.
5. Notify Commissioner and BECA of work completion.
6. Verify building enclosure materials and assemblies are ready for functional testing.
7. Retain the services of an approved independent BETA; submit qualifications of independent BETA to Commissioner for approval; coordinate all activities and deliverables of this BETA; ensure all BETA deliverables are provided to the Building Enclosure Commissioning Team.
8. Attend all required material and systems testing.
9. Execute all periodic maintenance or repairs required on started systems from initial Mock-up of equipment to Final Acceptance by Commissioner to prevent material warranties from being voided.
10. Submit maintenance logs of all interim maintenance or repair tasks performed by Contractor.

11. Ensure installation work is complete, is in compliance with Contract Documents, and is ready for Functional Performance Testing. FPT test results will be documented by BECA.
12. Ensure resolution of non-compliance and deficiencies in construction or test results. Obtain written documentation of completion from the appropriate subcontractors.
13. Provide letters of compatibility for adjacent building enclosure materials and assemblies.
14. Facilitate all repairs and retesting of failed condition at no additional cost to the City of New York.
15. Provide all warranty information to BECA.

D. Responsibilities of the BETA include without limitation the following:

1. Attend Commissioning kick-off meeting and other Building Enclosure Commissioning Team meetings.
2. Provide on-site technician and equipment to complete Mock-up and field Functional Performance Testing.
3. Prepare and submit reports to the Commissioner at the conclusion of all testing.
4. Perform retesting and prepare corresponding reports.

3.3 BUILDING ENCLOSURE COMMISSIONING TEAM (BECx) MEETINGS

A. BECx meetings will be held periodically, as determined by the Commissioner and recommended by BECA.

B. Discussions held in BECx meetings must include, but not be limited to: system/materials, mock-up/field, progress, scheduling, testing, documentation, deficiencies, and problem resolution.

C. The Contractor must attend BECx meetings, and must ensure the attendance of required subcontractors, as requested.

3.4 REPORTING

A. BECA will provide status reports to the Commissioner. The Commissioner will provide such status reports to the Contactor, CxA, Design Consultant, and other entities as needed.

B. BECA will submit non-compliance and deficiency reports to Commissioner. The Commissioner will provide such reports to the Contractor, CxA, Design Consultant, and other entities as needed.

C. BECA will provide a final summary report to Commissioner and CxA.

3.5 MOCK-UP AND FINAL CONSTRUCTION

A. Prior to Functional Performance Testing or concealment of functional performance layers within the building enclosure, the Contractor must verify that all assemblies are complete, including deficiency long items, and all Contract requirements are met.

3.6 FUNCTIONAL PERFORMANCE TESTING

A. Objectives and Scope

1. The objective of Functional Performance Testing is to demonstrate that the building enclosure is performing according to documented design intent and Contract Documents. Functional Performance Testing ensures and documents that the building enclosure systems are fully operational. Additionally, during Functional Performance Testing, areas of deficient performance are identified and corrected, improving building enclosure system performance.

B. Development of Test Procedures

1. The purpose of a specific test is to verify and document compliance of the installed enclosure systems with the OPR. Building Enclosure Functional Performance Test Protocols are provided in other sections of the Project Specifications for specific requirements regarding BECx.

C. Coordination and Scheduling

1. Contractor must provide sufficient notice to BECA, through the Commissioner, regarding completion schedule for materials and systems. Testing to be performed in conjunction with site visits. Contractor must schedule Functional Performance Tests with Commissioning Team. BECA must witness and document functional testing of equipment and systems. BETA, as retained by the Contractor, must execute tests under direction of BECA.

2. Successful completion of Mock-up functional performance testing must occur prior to full production installation of building enclosure materials and systems.

3.7 DOCUMENTATION, NON-CONFORMANCE, AND APPROVAL OF TESTS

A. Documentation

1. BECA must witness and document results of FPT.

B. Non-Conformance

1. BECA must record results of functional testing. Deficiency or non-conformance issues must be noted and reported to the Commissioner. The Commissioner must provide such non-conformance reports to the CxA, Design Consultant, Contractor, and other entities, as needed.

2. Corrections of minor deficiencies identified may be made during tests at the discretion of the Commissioner and as recommended by the BECA. In such cases, deficiency and resolution must be documented.

3. Every effort must be made to expedite testing and minimize unnecessary delays, while not compromising integrity of tests.

4. Deficiencies are handled in the following manner:
   a) BECA documents deficiencies and notes Contractor's response and intentions. A finding of deficiency will not end the testing process.
   b) BECA submits deficiency report to the Commissioner. The Commissioner will provide such deficiency report to the CxA, Contractor, Design Consultant, and other entities as required.
   c) Contractor corrects deficiency and certifies that material or assembly is ready to be retested.
   d) Contractor informs Commissioner of retesting schedule for coordination with the BECA.
   e) Contractor reschedules test with the Commissioner and BETA at no additional cost to the City of New York.
   f) If a test must be witnessed more than twice by the BECA due to repeated failure to perform as per the design documents, the Contractor must be responsible for the BECA's fee for witnessing repeated tests beyond the second incidence. Such fee will be negotiated between the BECA and the Commissioner.

C. Testing

1. Costs for all testing and retesting required for the Project will be the responsibility of the Contractor. The Contractor is to provide access to the test specimens to the Commissioning Team, through the Commissioner.

3.8 COMMISSIONING DOCUMENTATION

A. Final Report Details

1. Final BECx Report must include an executive summary, list of participants and roles, brief building description, overview of Commissioning and testing scope, and general description of testing and verification methods. Report must contain evaluation regarding:
   a) Conformance to Specifications and design intent.
   b) Material/system installation.
   c) Functional performance.
2. All outstanding non-compliance items must be specifically listed.
3. Recommendations for improvement to system or operations, future actions, etc. must also be listed.

END OF SECTION 01 91 15

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FMS ID: **LQQ122-RG**

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS
30-30 THOMSON AVENUE LONG ISLAND CITY, NEW YORK 11101-3045
TELEPHONE (718) 391-1000 WEBSITE www.nyc.gov/ddc

Department of Design and Construction

Contract for Furnishing all Labor and Material Necessary and Required for:

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

Rego Park Library: New Facility

LOCATION: **91-41 63rd Drive**
BOROUGH: **Queens, NY 11374**
CITY OF NEW YORK

Contractor

Dated _____ , 20 _____

Approved as to Form
Certified as to Legal Authority

Acting Corporation Counsel

Dated _____ , 20 _____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____ , 20 _____

Department of Design and Construction

PROJECT ID: **LQQ122-RG**

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

30-30 THOMSON AVENUE
LONG ISLAND CITY, NEW YORK 11101-3045
TELEPHONE (718) 391-1000
WEBSITE www.nyc.gov/ddc

VOLUME 3 OF 3

ADDENDUM TO THE GENERAL CONDITIONS

SPECIFICATIONS

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR:

Rego Park Library: New Facility

LOCATION: **91-41 63rd Drive**
BOROUGH: **Queens, NY 11374**
CITY OF NEW YORK

CONTRACT NO. 1 **GENERAL CONSTRUCTION WORK**

Queens Borough Public Library

Weiss Manfredi Architects

Date: **August 19, 2024**

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDUM TO THE GENERAL CONDITIONS FOR SINGLE CONTRACT PROJECTS

The General Conditions are hereby amended in accordance with the terms and conditions set forth in this Addendum.

I. PROJECT DESCRIPTION

FMS #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

PROJECT DESCRIPTION: This Project consists of the demolition of an existing single-story library and the construction of a new library with two above-grade floors and a cellar.

PROJECT LOCATION: **91-41 63rd Drive**
BOROUGH: **Queens**
CITY OF NEW YORK
ZIP CODE: **11374**
COMMUNITY BOARD #: **6**

LANDMARK STATUS:

DESIGNATED LANDMARK STRUCTURE OR SITE: ***NO***
If this is a Designated Landmark Structure or Site, Section 01 3591, Historic Treatment Procedures applies to this project.
LANDMARK QUALITY STRUCTURE: ***NO***
If this is a Landmark Quality Structure, Section 01 3591, Historic Treatment Procedures applies to this project.

II. LEED GREEN BUILDING REQUIREMENTS

This project must achieve a ***Silver*** LEED Green Building Rating. A certain number of credits are required for this rating and are detailed in the Addendum.

Sections 01 7419 Sub-Section 1.5(C) Waste Management Performance Requirements / LEED Certification, 01 8113.04 Sustainable Design Requirements for LEED v4 Buildings and 01 8119 Indoor Air Quality Requirements for LEED Buildings of the DDC Standard General Conditions apply to this project.

III. COMMISSIONING REQUIREMENTS

This project includes ***MEP and Building Enclosure*** Commissioning Requirements.

The General Commissioning Requirements for MEP Systems are found in Section 01 9113 of the DDC Standard General Conditions.

The General Commissioning Requirements for Building Enclosure are found in Section 01 9115 of the DDC Standard General Conditions.

Other specific Commissioning Requirements can be found in the Project Specification Sections.

IV. PROJECT MANAGEMENT

[X] DDC will publicly bid and enter into all contracts for the Project. DDC will manage the Project using its own personnel.

[ ] DDC will publicly bid and enter into all contracts for the Project. A Construction Management firm (the "CM") hired by DDC will manage the Project. The Contractor is advised that the CM will serve as the representative of the Commissioner at the site and will, subject to review by the Commissioner, be responsible for the inspection, management, coordination and administration of the required construction work, as delineated in the article of the Standard Construction Contract entitled "The Resident Engineer".

V. CONTRACTS FOR THE PROJECT

The Project consists of a single contract, the Contract for General Construction Work. The Contractor for General Construction Work is responsible for the performance of all required work for the Project as set forth in the Contract Documents (General Conditions, Drawings and Specifications), including all responsibilities and obligations assigned to separate Contractors for the following subdivisions of the work: Plumbing Work, HVAC Work, and Electrical Work. All responsibilities and obligations in the Contract Documents assigned to separate Contractors for such subdivisions of the work are the responsibility of the Contractor for General Construction Work.

VI. SCHEDULES

The Contractor is advised that Schedules A through E are attached to, and incorporated as part of, this Addendum to the General Conditions. These schedules contain important information that is specific to this Project. The Contractor is advised to carefully review these schedules.

VII. APPLICABILITY OF SECTIONS/SUB-SECTIONS AND AMENDED SUB-SECTIONS

The Contractor is advised that various Sections/Sub-Sections in the General Conditions may not apply to this Project or may apply as amended. Such Sections/Sub-Sections advise the Contractor to "Refer to the Addendum for the applicability of this Section/Sub-Section." Such Sections/Sub-Sections are set forth below. A check mark indicates whether the Section/Sub-Section (1) applies to the Project, (2) does not apply to the Project, or (3) applies to the Project as amended. If no box is checked, the Section/Sub-Section, as set forth in the General Conditions, applies to the Project. Amended Sections/Sub-Sections, if any, are set forth following this list of Sections.

Section	Sub-Section	Sub-Section	Applies		Does not Apply		Applies as Amended
01 1000	1.4 (B)	Scope and Intent / LEED	X				
	1.4(C)	Scope and Intent / Commissioning	X				
01 21 13.10		Price Adjustment Allowance	X				
01 22 00		Expanded Work Allowance	X				
01 3216.10		Project Schedules (Method A)			X		
01 3216.20		Project Schedules (Method B)			X		
01 3216.30		Project Schedules (Method C)	X				
	1.7 Q	Cost Loaded Schedule	X				
01 3233		Photographic Documentation	X				
01 3300	1.7 (A-D)	LEED Submittals	X				
01 3503		General Mechanical Requirements	X				
01 3506	3.2 (A-B)	Electrical Conduit System Including Boxes (Pull, Junction and Outlet)	X				
	3.3 (A-E)	Electrical Wiring Devices	X				
	3.4 (A-I)	Electrical Conductors and Terminations	X				
	3.5 (A-B)	Circuit Protective Devices	X				
	3.6 (A-J)	Distribution Centers	X				
	3.7 (A-I)	Motors	X				
	3.8 (A-I)	Motor Control Equipment	X				
01 3591		Historic Treatment Procedures			X		
01 5000	3.2 (A)	Temporary Water Facilities / Temporary Water	X				
	3.2 (B)	Temporary Water Facilities / Temporary Water – Work in Existing Facilities	X				
	3.3 (B)	Temporary Sanitary Facilities / Self-Contained Toilet Units	X				
	3.3 (C)	Temporary Sanitary Facilities / Existing Toilets	X				
	3.4 (B) 1	Temporary Power, Lighting, and Site Lighting / Connection to Utility Lines	X				
	3.4 (B) 2	Temporary Power, Lighting, and Site Lighting / Connection to Existing Electrical Power Service			X		
	3.4 (B) 3	Temporary Power, Lighting, and Site Lighting / Electrical Generator Power Service	X				
	3.4 (D)	Temporary Power, Lighting, and Site Lighting / Temporary Lighting	X				
	3.4 (E)	Temporary Power, Lighting, and Site Lighting / Site Security Lighting (for New Construction Only)	X				
	3.5 (A-J)	Temporary Heat	X				
	3.8 (A)	DDC Field Office / Office Space in Existing Building			X		

Section	Sub-Section	Sub-Section	Applies		Does not Apply		Applies as Amended
01 5000	3.8 (B)	DDC Field Office / DDC Field Office Trailer	X				
	3.8 (B-3a)	DDC Field Office / DDC Managed Field Office Trailer	X				
	3.8 (B-3b)	DDC Field Office / CM Managed Field Office Trailer			X		
	3.8 (D)	DDC Field Office / Additional Equipment for the DDC Field Office	X				
	3.13(A-D)	Work Fence Enclosure	X				
	3.14 (A-H)	Rodent and Insect Control	X				
	3.17(B)	Project Rendering	X				
	3.18 (A-D)	Security Guards / Fire Guards on Site					X
01 5411	3.1 (A-J)	Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Up To and Including 15 Stories			X		
	3.2 (A-M)	Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Over 15 Stories			X		
	3.3 (A-E)	Temporary Use, Operation and Maintenance of Elevators During Construction for Existing Buildings			X		
01 5423	1.9 (A-C)	Sidewalk Sheds	X				
01 7300	3.3 (A-I)	Surveys	X				
	3.4 (A-B)	Borings			X		
	3.12 (A-D)	Sleeves and Hangers	X				
	3.13 (A)	Sleeve and Penetration Drawings	X				
	3.15 (A)	Location of Partitions	X				
01 7419	1.5 (C)	Waste Management Performance Requirements / LEED Certification	X				
01 7900		Demonstration and Owner's Pre-Acceptance Orientation	X				
01 8113.03		Sustainable Design Requirements for LEED v3 Buildings			X		
01 8113.04		Sustainable Design Requirements for LEED v4 Buildings	X				
01 81 13.10		Environmentally Preferable Purchasing (EPP) Compliance	X				
01 8113.13		VOC Limits for Adhesives, Sealants, Paints and Coatings for LEED v3 Buildings			X		
01 8119		Indoor Air Quality Requirements for LEED Buildings	X				
01 9113		General Commissioning Requirements for MEP Systems	X				
01 9115		General Commissioning Requirements for Building Enclosure	X				

AMENDED SECTIONS/SUB-SECTIONS

The Contractor is advised that the amended Sub-Sections set forth below are included in the General Conditions and apply to the Project.

01 1000 Summary: Add the following article:

1.13 INDEMNIFICATION AGREEMENT

A. The Contractor is required to enter into a separate indemnification agreement with the Queens Library based on the language in the sample in the Project's Appendix, included in the PASSPort RFx.

01 5000/3.18(A-C) Security Guards on Site

The contractor is required to provide full time security guard(s) in compliance with General Conditions Specification 015000, Section 3.18.

In addition to the requirements set forth in the above referenced General Conditions, any day that the contractor and/or its subcontractors do not work on the site during the day, a security guard must be provided during the hours of 8:00 A.M. to 4:00 P.M

The Contractor is advised that the amended Sub-Sections set forth below are included in the General Conditions and apply to the Project.

VIII. SPECIAL EXPERIENCE REQUIREMENTS FOR THE PROJECT

Refer to the PASSPort Questionnaire for Special Experience Requirements.

IX. REVISIONS: SPECIFICATIONS AND CONTRACT DRAWINGS

The Specifications and the Contract Drawings for the Project are revised in accordance with the provisions set forth below.

(1) Owner: Wherever the term “Owner” is used in the Specifications and/or the Contract Drawings, such term means the City of New York.

(2) Other Entities: In the event any entity other than the City of New York is referred to or named as the “Owner” in the Specifications and/or the Contract Drawings, the name of such other entity is deemed deleted and replaced with the “City of New York”.

(3) Architect / Engineer: Wherever the words “Architect”, “Engineer”, “Architect / Engineer” or “Architect and/or Engineer” are used in the Specifications and/or the Contract Drawings, such words are deemed deleted and replaced with the word “Commissioner”.

(4) Products / Manufacturers: Wherever the Specifications and/or the Contract Drawings require the Contractor to provide a particular product (i.e., material and/or equipment) from a designated manufacturer and/or vendor, the term “or approved equal” is deemed inserted, even if only one product and/or manufacturer is specified, except as otherwise provided below.
   (a) Proprietary Items: If the Documents section in PASSPort contains a Notice which identifies a particular product from a designated manufacturer as a "Sole Source Product, the Contractor is required to provide such specified product. In such case, no substitution or “approved equal” will be permitted.

(5) Special Experience Requirements: Special Experience Requirements for the Project, if any, are set forth in the PASSPort Questionnaire. Special Experience Requirements may apply to Contractors, subcontractors, installers, fabricators, applicators, erectors, specialists, manufacturers and/or suppliers. Refer to DDC General Conditions Section 014000 Article 1.7.C for applicable Special Experience qualification levels. If the Specifications and/or the Contract Drawings contain any Special Experience Requirement that is not set forth in the PASSPort Questionnaire, such Special Experience Requirement is deemed deleted, except as otherwise provided below.
   (a) Any Special Experience Requirement that provides that the entity performing the work or supplying the material must have more than three (3) years of experience, is revised to provide that the entity performing the work or supplying the material must have three (3) years of experience as noted in DDC General Conditions Section 014000 Quality Requirements, Article 1.7.B, except as described in paragraph (b) below.
   (b) Any Special Experience Requirement that pertains to the abatement of hazardous materials is not be subject to the deletion and/or revision set forth above. Such Special Experience Requirement remains in full force and effect.
   (c) Except as set forth in the DDC General Conditions Article 1.7, any Special Experience Requirement that provides that the individual workers performing the work must be licensed, authorized, certified, approved by or acceptable to the manufacturer, is deemed deleted and replaced with the requirement that such individual workers must be properly trained for the specified work.

(6) Alternate Bids: If the agency is requesting the submission of Alternate Bids, a Notice regarding such Alternate Bids is set forth in the Documents section in PASSPort. In the event of any conflict or inconsistency between (1) the Notice regarding Alternate Bids set forth in the Documents section in PASSPort and (2) a provision in the Specifications and/or the Contract Drawings regarding Alternate Bids, the Notice set forth in the Documents section in PASSPort will prevail. If the agency is not requesting the submission of Alternate Bids, as indicated by the absence of a Notice in the Documents section in PASSPort, and the Specifications and/or the Contract Drawings contain any provision regarding Alternate Bids, such provision is deemed deleted.

(7) Contractor Retained Engineer: If the Specifications and/or the Contract Drawings require the Contractor to retain an Engineer to provide engineering services for the Project, the following sentence is deemed inserted: “Such Engineer must be a Professional Engineer, licensed in the State of New York.”

(8) LEED Related Provisions: If the Specifications and/or the Contract Drawings require the Contractor to purchase FSC certified wood, rapidly renewable materials, or materials within 500 miles (LEED v3) or 100 miles (LEED v4), such provisions are deemed deleted and replaced with the requirement that if the Contractor has purchased

FSC certified wood, rapidly renewable materials, or materials within 500 miles (LEED v3) or 100 miles (LEED v4), the Contractor must submit such forms or documentation as may be required by the City in order for the USGBC to certify that the Project qualifies for the related LEED credit(s).

(9) Guarantees: Requirements for Guarantees and Maintenance are set forth in Schedule B, which is included in the Addendum to the General Conditions. In the event of any conflict or inconsistency between (1) a guarantee and/or maintenance requirement set forth in the Specifications and/or the Contract Drawings and (2) a guarantee and/or maintenance requirement set forth in Schedule B, the guarantee and/or maintenance requirement set forth in Schedule B will prevail.

(10) Warranties: Requirements for Warranties are set forth in Schedule B, which is included in the Addendum to the General Conditions.
- (a) The term "manufacturer's warranty" as described in this article encompasses the following terms as indicated in the Specifications: "Manufacturer's Warranty", "Manufacturer's Special Warranty", "Special Warranty", "Special Finish Warranty", "Manufacturer's Special Warranty for a (product, assembly)."
- (b) In the event of any conflict or inconsistency between (1) a warranty requirement set forth in the Specifications and/or the Contract Drawings and (2) a warranty requirement set forth in Schedule B, the warranty requirement set forth in Schedule B will prevail.
- (c) In the event a warranty requirement set forth in the Specifications and/or the Contract Drawings is omitted from Schedule B, such omission from Schedule B has no effect and the Contractor's obligation to provide the manufacturer's warranty, as set forth in the Specifications and/or the Contract Drawings, will remain in full force and effect.
- (d) In the event a warranty requirement for a particular item of material or equipment is omitted from Schedule B, as well as from the Specifications or the Contract Drawings, and the manufacturer of such item actually provides a warranty, the Contractor is obligated to obtain and deliver to the Commissioner the highest level of warranty actually provided by that manufacturer.

(11) Exculpatory Provisions: In the event the Specifications and/or the Contract Drawings contain any provision whereby the consultant and/or any of its officers, employees or agents, including subconsultants, is absolved of responsibility for any act or omission, such provision is deemed deleted.

(12) Insurance: Provisions regarding insurance coverage the Contractor is required to provide are set forth in Article 22 of the City of New York Standard Construction Contract and Schedule A, which is included in the Addendum to the General Conditions. In the event the Specifications and/or the Contract Drawings contain any provision regarding insurance requirements, such provision is deemed deleted.

(13) Indemnification: Provisions regarding indemnification are set forth in Articles 7, 12, 22 and 57 of the City of New York Standard Construction Contract and, if applicable, in the Indemnification Agreement in the Appendix. In the event the Specifications and/or the Contract Drawings contain any provision regarding indemnification, such provision is deemed deleted.

(14) Dispute Resolution: Provisions regarding dispute resolution are set forth in Article 27 of the City of New York Standard Construction Contract. In the event the Specifications and/or the Contract Drawings contain any provision regarding dispute resolution, such provision is deemed deleted.

(15) Payment to Other Entities: In the event the Specifications and/or the Contract Drawings contain any provision which requires the Contractor to make payments to an entity other than a subcontractor and/or supplier providing services and/or material for the project, such provision is deemed deleted.

(16) General Conditions: In the event of any conflict or inconsistency between (1) the Specifications and/or the Contract Drawings and (2) the General Conditions, the General Conditions will prevail.

(17) Standard Construction Contract: In the event of any conflict or inconsistency between (1) the Specifications and/or the Contract Drawings and (2) the City of New York Standard Construction Contract, the City of New York Standard Construction Contract shall prevail.

(18) Shall: Wherever the word "shall" is used in the Specifications and/or the Contract Drawings with respect to the Contractor's or Subcontractor's responsibilities or Project Requirements, the term is intended to covey a contractual mandate, such as the terms "must," "will," or "be obliged to" (and not "may").

SCHEDULE A (FOR PUBLICLY BID PROJECTS)
PART I - Contract Requirements

Various Articles of the Contract refer to requirements which are set forth in Schedule A of the General Conditions. The Schedule set forth below specifies the following: (1) the referenced Articles of the Contract, and (2) the specific requirements applicable to the contract.

REFERENCE	ITEM	REQUIREMENTS	CONTRACT #1	
Information For Bidders	Bid Security	The Contractor must obtain a bid security in the amount indicated to the right.	Required provided the TOTAL BID PRICE set forth on the Bid Form is $1,000,000. or more. Certified Check: 2% of Bid Amount or Bond: 10% of Bid Amount	
Information For Bidders	Performance and Payment Bonds		For Contracts in the amount of $1,000,000.00 or more, Performance and Payment Bonds must each be in amount equal to 100% of the Contract Price.	
Information For Bidders	Department of Design and Construction Safety Requirements	The Contractor must provide the safety personnel as indicated to the right	■ Project Safety Representative □ Dedicated, full-time Project Safety Representative	
Article 14 Contract	Time of Substantial Completion	Consecutive Calendar Days	**915 ccds**	
Article 15 Contract	Liquidated Damages	For each consecutive calendar day over completion time	**$600.00**	
Article 17 Contract	Sub-Contracts	Not to exceed Percent of Contract Price	**60%**	
Article 21 Contract	Retainage	Percent of Voucher	If 100% bonds are required	**5%**
			If 100% bonds are not required, and Contract Price is $1,000,000 or less	**5%**
			If 100% bonds are not required, and Contract Price is more than $1,000,000	**10%**
Article 24 Contract	Deposit Guarantee	Percent of Contract Price	**1%**	
Article 24 Contract	Period of Guarantee		See Schedule B of the Addendum to the General Conditions	
Article 75 Contract	Compensation to be Paid to Contractor		Amount for which the Contract was Awarded: _____ _____ Dollars ($_____)	
Article 79 Contract	MWBE Program		See M/WBE Utilization Plan in the PASSPort Procurement M/WBE Considerations Section.	

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Note: All certificate(s) of insurance submitted pursuant to Contract Article 22.3. 3 must be accompanied by a Certification by Broker consistent with Part III below and include the following information:

- **For each insurance policy, the name and NAIC number of issuing company, number of policy, and effective dates;**
- **Policy limits consistent with the requirements listed below;**
- **Additional insureds or loss payees consistent with the requirements listed below; and**
- **The number assigned to the Contract by the City (in the "Description of Operations" field).**

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Commercial General Liability Art. 22.1.1	This Contract requires Commercial General Liability Insurance (CGL) that is at least as broad as ISO Form CG 00 01 (see Section 22.1.1 of the New York City Standard Construction Contract). The minimum limits shall be $1,000,000.00 per occurrence and $2,000,000.00 per project aggregate applicable to this Contract unless the Work requires a permit from the Department of Buildings and greater limits of Commercial General Liability Insurances are required pursuant to 1 RCNY section 101-08. Additional Insureds: 1. City of New York, including its officials and employees, with coverage at least as broad as ISO Forms CG 20 10 and CG 20 37, and 2. All person(s) or organization(s), if any, that Article 22.1.1(b) of the **Contract** requires to be named as Additional Insured(s), with coverage at least as broad as ISO Form CG 20 26. The Additional Insured endorsement shall either specify the entity's name, if known, or the entity's title (e.g., Project Manager). 3. The Queens Borough Library and the Library Board of Trustees 4. Ronco Realty LLC 5. North Fork Holding LLC

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Workers' Compensation Art. 22.1.2 ■ Disability Benefits Insurance Art. 22.1.2 ■ Employers' Liability Art. 22.1.2 □ Jones Act Art. 22.1.3 □ U.S. Longshoremen's and Harbor Workers Compensation Act Art. 22.1.3	Workers' Compensation, Employers' Liability, and Disability Benefits Insurance: Statutory per New York State law without regard to jurisdiction. **Note**: The following forms are acceptable: (1) New York State Workers' Compensation Board Form No. C-105.2, (2) State Insurance Fund Form No. U-26.3, (3) New York State Workers' Compensation Board Form No. DB-120.1 and (3) Request for WC/DB Exemption Form No. CE-200. The City will not accept an ACORD form as proof of Workers' Compensation or Disability Insurance. Jones Act and U.S. Longshoremen's and Harbor Workers' Compensation Act: Statutory per U.S. law.
■ Builders' Risk Art. 22.1.4	100 % of total value of **Work** **Contractor** the Named Insured; the **City** both an Additional Insured and one of the loss payees as its interests may appear. If the **Work** does not involve construction of a new building or gut renovation work, the **Contractor** may provide an installation floater in lieu of Builders Risk insurance. Note: Builders Risk Insurance may terminate upon **Substantial Completion** of the **Work** in its entirety.
■ Commercial Auto Liability Art. 22.1.5	$1,000,000.00 per accident combined single limit If vehicles are used for transporting hazardous materials, the **Contractor** shall provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
□ Contractor's Pollution Liability Art. 22.1.6	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
□ Marine Protection and Indemnity Art. 22.1.7(a)	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
□ Hull and Machinery Insurance Art. 22.1.7(b)	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
□ Marine Pollution Liability Art. 22.1.7(c)	$_____ each occurrence Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 □ Ship Repairers Legal Liability	$_____ each occurrence

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions (Continued)

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
[OTHER] Art. 22.1.8 □ Collision Liability/Towers Liability	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 □ Railroad Protective Liability _____	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 ■ Asbestos Liability	Only required of the Contractor or Subcontractor performing any required asbestos removal. $1,000,000 each occurrence, $2,000,000 aggregate (Combined Single Limit); only required of the Contractor or Subcontractor performing any required asbestos removal. Additional Insureds: 1. City of New York, including its officials and employees, and 2. The Queens Borough Library and the Library Board of Trustees 3. Ronco Realty LLC 4. North Fork Holding LLC

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions (Continued)

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

[OTHER] Art. 22.1.8 ■ Boiler Insurance_____	 $200,000
[OTHER] Art. 22.1.8 ■ Professional Liability In the event any section of the Specifications requires the Contractor to engage a Professional Engineer to provide design and/or engineering services, the Engineer engaged by the Contractor, as well as any sub consultant(s) performing professional services, shall provide Professional Liability Insurance.	$1,000,000 per occurrence The Contractor's Professional Engineer shall maintain and submit evidence of Professional Liability Insurance in the minimum amount of $1,000,000 per claim. The policy or policies shall include an endorsement to cover the liability assumed by the Contractor under this Agreement arising out of the negligent performance of professional services or caused by an error, omission or negligent act of the Contractor's Professional Engineer or anyone employed by the Contractor's Professional Engineer. Claims-made policies will be accepted for Professional Liability Insurance. All such policies shall have an extended reporting period option or automatic coverage of not less than two (2) years. If available as an option, the Contractor's Professional Engineer shall purchase extended reporting period coverage effective on cancellation or termination of such insurance unless a new policy is secured with a retroactive date, including at least the last policy year.
OTHER] Art. 22.1.8 □ Umbrella/Excess Liability Insurance The Contractor shall provide Umbrella/Excess Liability Insurance in the minimum amounts shown to the right. The policy terms and condition should be at least as broad as the underlying policies. The underlying policies should comply with the insurance provision as outlined by the contract. Defense cost should be in addition to the limit of liability. The City of New York, including its officials and employees, should be included as additional insured as respects to the noted project.	$10,000,000 per Occurrence and $10,000,000 in Aggregate

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. Certificates of Insurance

All certificates of insurance (except certificates of insurance solely evidencing Workers' Compensation Insurance, Employer's Liability Insurance, and/or Disability Benefits Insurance) must be accompanied by one of the following:

(1) the Certification by Insurance Broker or Agent on the following page setting forth the required information and signatures;

-- OR --

(2) copies of all policies as certified by an authorized representative of the issuing insurance carrier that are referenced in such certificate of insurance. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. Certification by Insurance Broker or Agent

The undersigned insurance broker or agent represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects.

_____

[Name of broker or agent (typewritten)]

_____

[Address of broker or agent (typewritten)]

_____

[Email address of broker or agent (typewritten)]

_____

[Phone number/Fax number of broker or agent (typewritten)]

_____

[Signature of authorized official or broker or agent]

_____

[Name and title of authorized official, broker or agent (typewritten)]

State of ……...)
) ss:
County of ……)

Sworn to before me this

_____ day of _____, 20__

_____

NOTARY PUBLIC FOR THE STATE OF_____

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART IV. Address of Commissioner

Wherever reference is made in Article 7 or Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents must be sent via email to insurance@ddc.nyc.gov. Hard copies of such documents will no longer be required or accepted.

SCHEDULE B

Guarantees and Warranties

(Reference: Section 01 7839, Article 2.7 of the DDC Standard General Conditions)

GUARANTY FROM CONTRACTOR

(1) Contractor's Guaranty Obligation: The Contractor must promptly repair, replace, restore or rebuild, as the Commissioner may determine, any finished Work in which defects of materials or workmanship may appear or to which damage may occur because of such defects, during the one (1) year period subsequent to the date of Substantial Completion (or use and occupancy in accordance with the Contract), except for the areas of Work set forth below:

- Roofing, Waterproofing, and Joint Sealant Work. For these types of work, the guarantee period will be (2) two years.

- Trees and/or Plant Material. For trees and/or plant material furnished and installed, the guarantee period will be (2) two years. During the guarantee period, the Contractor must provide all maintenance services set forth in the Specifications.

(2) Guaranty Period: The obligation of the Contractor, and its Surety under the Performance Bond, is limited to the period(s) of time specified above.

(3) Other Provisions Deemed Deleted: In the event the Specifications and/or the Contract Drawings contain any provisions regarding guaranty requirements, such provisions are deemed deleted and replaced with the guaranty requirements set forth in this Schedule B.

****

WARRANTY FROM MANUFACTURER

(1) Contractor's Obligation to Provide Warranties: The items of material and/or equipment for which manufacturer warranties are required are listed below. For each item of material and/or equipment listed below, the Contractor must obtain a written warranty from the manufacturer. Such warranty must provide that the material or equipment is free from defects for the period set forth below and will be replaced or repaired within such specified period. The Contractor must deliver all required warranties to the Commissioner.

(2) Required Warranties:

Spec Number	Material or Equipment	Warranty Period
071326	Self-Adhering Sheet Waterproofing	3 years
071416	Cold Fluid-Applied Waterproofing	10 years
071700	Bentonite Waterproofing	5 years
074213.16	Metal Plate Wall Panels	20 years
075423	Thermoplastic-Polyolefin (TPO) Roofing	20 years
076200	Sheet Metal Flashing and Trim	20 years
077100	Roof Specialties	20 years
079100	Preformed Joint Seals	5 years
079200	Joint Sealants	2 years
081416	Flush Wood Doors	Life of installation
083323.13	Overhead Coiling Shutters	2 years
084423	Structural-Sealant-Glazed Curtain Walls	20 years
087100	Door Hardware (u.o.n.)	3 years
087100	Door Hardware: Exit Devices	2 years
087100	Door Hardware: Manual Closers	10 years

088000	Glazing: Coated, Laminated, and Insulating Glass	10 years
088000	Glazing: Heat-Soaked Tempered Glass	5 years
096813	Tile Carpeting	10 years
102813	Toilet Accessories: Mirrors	10 years
102813	Toilet Accessories: Hand Dryers	2 years
105113	Metal Lockers	10 years
115116	Book Depositories	10 years
115119	Book Theft Protection Equipment	10 years
115123	Library Stack Systems	Life of installation
142123.16	Machine Room-Less Electric Traction Passenger Elevators	2 years
220533	Heat Tracing for Plumbing Piping	10 years
221316	Sanitary Waste and Vent Piping	1 year
223300	Electric Domestic Water Heaters	3 years
230923	Direct Digital Control (DDC) System for HVAC	2 years
235216	Condensing Boilers	10 years
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283121	Area and Perimeter Intrusion Detection	2 years
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(3) Application: The obligations under the warranty for the periods specified above apply only to the manufacturer of the material or equipment, and not to the Contractor or its Surety; provided, however, the Contractor retains responsibility for obtaining all required warranties from the manufacturers and delivering the same to the Commissioner.

(4) Other Provisions: The warranty requirements set forth in this Schedule B are also included in the Specifications.

(a) In the event of any conflict between a warranty requirement set forth in the Specifications and a warranty requirement set forth in Schedule B, the warranty requirement set forth in Schedule B will take precedence.

(b) In the event a warranty requirement set forth in the Specifications is omitted from Schedule B, such omission from Schedule B will have no effect and the Contractor's obligation to provide the manufacturer's warranty, as set forth in the Specifications, will remain in full force and effect.

(c) In the event a warranty requirement for a particular item of material or equipment is omitted from both Schedule B and the Specifications, and the manufacturer of such item actually provides a warranty, the Contractor is obligated to obtain and deliver to the Commissioner the highest level of warranty actually provided by that manufacturer.

(d) In the event a warranty requirement is provided for a particular item of material or equipment, and such requirement specifies a warranty period that is longer than that which is actually provided by any of the specified manufacturers, the Contractor is obligated to obtain and deliver to the Commissioner the highest level of warranty actually provided by any of the specified manufacturers, unless otherwise directed in writing by the Commissioner.

(e) Unless indicated otherwise, Warranties are to take effect on the date of Substantial Completion.

SCHEDULE C

Contract Drawings

(Reference: Section 01 1000, Article 1.5 (A) of the DDC Standard General Conditions)

The Schedule set forth below lists all Contract Drawings for the Project.

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G-003 BUILDING CODE SUMMARY
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Electrical Motor Control Equipment

(Reference: 01 3506, Article 3.8 of the DDC Standard General Conditions)

Requirements for electrical motor equipment may be included in one or more sections of the Specifications for the Contract for the Project. Schedule D set forth below delineates specific information for electrical motor control equipment. In the event of any conflict between the Specifications and this Schedule D, Schedule D will take precedence; provided, however, in the event of an omission from Schedule D (i.e., Schedule D omits either a reference to or information concerning electrical motor equipment which is set forth in the Specifications), such omission from Schedule D will have no effect and the Contractor's obligation with respect to the electrical motor control equipment, as set forth in the Specifications, will remain in full force and effect.

DB Disconnect Circuit Breaker (Switch)
TS Thermal Switch
MS Magnetic Starter
CMS Comb. Mag. Starter
P Pilot Light
F Firestat
T Thermostat
AL Alternator
BG Break Glass Station
HOA Hand-Off Auto.
PB Push Button Station
RO Remote "off"

Equip. Ident.	Location	# of Units	HP or KW	Volts and Phase	Control Type: See legend above	Remarks:
PC-C-1&2	Boiler Room	2	See Schedules	See Schedules	HOA/RO	1 Active / 1 Standby
GX-R-1	Roof	1	See Schedules	See Schedules	HOA/DB	
TX-R-1	Roof	1	See Schedules	See Schedules	HOA/DB	
AHU-R-1	Roof	1	See Schedules	See Schedules	HOA/RO	
TF-C-1	Elec Room	1	See Schedules	See Schedules	DB/T	
FPB	Cellar, Level 1 & Level 2	See plans	See Schedules	See Schedules	DB/T	
UH	Cellar, Level 1 & Roof	See plans	See Schedules	See Schedules	DB/T	
VRF	Cellar	See plans	See Schedules	See Schedules	DB/T	
FCU	Level 1	1	See Schedules	See Schedules	DB//T	
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CONTRACT # 1

GENERAL CONSTRUCTION WORK

SECTION 011800 – PROTECTION OF EXISTING UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Identify and field mark-out all site utilities to remain in operation and/or be relocated during construction.
2. Submit procedures to be used to ensure the safety of the utilities.
3. Repair any damage during construction operations.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

B. Existing Conditions: Accurately record actual locations of capped utilities, utilities to remain and utility lines encountered during construction.

1. Use sufficiently detailed photographs or video recordings.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.5 REGULATORY REQUIREMENTS

A. Notify affected utility companies, City of New York, and Commissioner before starting work.

PART 2 - PRODUCTS – NOT APPLICABLE

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 IDENTIFICATION

A. Locate underground utilities within the site and in off-site areas impacted by the project site. If utilities are indicated to remain in place, provide adequate means of support and protection during the work. In the event of identifying an unforeseen conflict/condition, notify the Commissioner immediately.

B. Consult utility owner immediately for direction if uncharted, or incorrectly charted, piping or other utilities are encountered during excavation. Cooperate with utility owner to keep respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.

C. Do not interrupt existing utilities serving facilities occupied by the City of New York or others except when permitted in writing by the Commissioner and then only after acceptable temporary utility services have been provided.

D. Utilities to be capped and later reused must be clearly identified, marked in the field, and noted on as-built drawings. Contractor to obtain all permitting required to perform plugs on existing utilities.

E. By law, excavators and contractors working in New York City must contact New York 811 at least 2 full business days, not including the day of call, prior to digging by dialing 811.

3.3 PROTECTION

A. Consult all available public utility records for existing utilities prior to commencement of any work. Note all conditions and limitations which might affect the work.

B. Become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area. Do not damage any of those that are to remain and leave them accessible.

C. Execute the Work so as not to cause damage to existing public and adjoining or adjacent structures, streets, paving, sewers, gas, water, electric or any other utilities; any damage caused by construction activities must be immediately repaired at Contractor’s expense.

D. Protect all existing utilities (including sewers, water lines, electrical lines and telecommunication lines) to remain in use within and adjacent to the area affected by the Work.

E. Protect all survey monuments, bench marks and other reference features on streets bounding this project. Contractor to replace any disturbed features at its own expense.

F. Flag, barricade or suitably protect existing utilities during construction operations.

G. Provide, at a minimum, timber mats at locations where equipment will cross existing utilities at unimproved areas. Provide any other safety measures and follow any additional procedures requested by the utility owner.

3.4 REPAIRS

A. Immediately repair any damage to existing utilities with the least impact to the utility service and to operational standards. In the event Contractor fails to make immediate repairs, the City of New York and/or the utility owner will complete the repairs and Contractor will be responsible for all resultant costs.

B. Conduct post construction condition surveys. Repair any damage to the utilities to the condition identified in the pre-demolition survey (See Section 024116 – Structure Demolition). The Commissioner and/or utility owner (i.e. Con Edison) shall determine the acceptability of any repairs.

END OF SECTION 011800

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Coordination and acquisition of demolition-related permits.
2. Planning and preparation for the Work, including but not limited to:
    a. Scheduling of the Work in work phases, including abatement of asbestos and other hazardous material
    b. Demolition, including design, fabrication, and installation of systems required for demolition.
3. Creation of a secure barrier around the site.
4. Abatement of hazardous materials.
5. Demolition and removal of existing building structure, as indicated.
6. Demolition and removal of selected site elements.
7. Removal and/or abandonment (termination and sealing) of select utilities.
8. On-site concrete and masonry crushing operations.
9. Temporary site stabilization, backfill, and grading for future work.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

1.4 INFORMATIONAL SUBMITTALS

A. GENERAL.

1. Commissioner's review of the Contractor's submittals is limited to checking for general conformance with the design intent and does not relieve Contractor of its responsibility to perform the work in a safe manner and in strict accordance with the Contract Documents and DDC General Conditions.

B. UTILITY SCHEDULE

1. No later than 30 days prior to the commencement of demolition, the Contractor shall submit to the Commissioner and all affected utility/service companies, a proposed list and dates of all utilities/services that are to be shut off and/or capped, as well as the services that are to continue. The Contractor shall provide the Commissioner with written confirmation from all utility or service companies serving the site that services were properly terminated prior to capping, abandonment or removal.
2. Contractor shall accurately locate and mark on a set of Contract Drawings the location of all underground utilities and services within the contract limit area that have been capped and those that are to remain.

C. DEMOLITION SCHEDULE/PLAN

1. No later than 30 days prior to the commencement of demolition, the Contractor shall submit to Commissioner for review a detailed written description of the methods and operations of demolition and a schedule for all proposed Work. This submission shall include a step-by-step description of the preparatory work, protection of structures and personnel, debris management and disposal and other pertinent items.

2. Provide a comprehensive Demolition Plan, including the following:

   a. A detailed work area drawing showing work, staging, secured entry/access areas, and site protection features.

   b. Detailed schedule and sequence of work conforming to City of New York's schedule requirements, coordinated with abatement work. Provide both narrative and sketches to show intended phasing and sequence.

   c. Description of process to verify and ensure utility disconnections.

   d. Coordination for shutoff, capping, and continuation of utility services, if any.

   e. Detailed outline of intended structural stabilization, demolition, and disposal procedures. Include a detailed sequence of reinforcement, demolition, and removal work, with starting and ending dates for each activity.

   f. Description of equipment and methods to be used.

   g. Detailed description of dust and noise control measures

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements".

B. All demolition activities shall be completed in accordance with DDC General Conditions and industry standards.

C. Contractor shall assign a competent and experienced demolition superintendent, who shall be present at the site daily during all operating hours of the project. The demolition superintendent shall be responsible for overseeing demolition operations and ensuring that the designated demolition and health and safety procedures are implemented in the field.

D. The Commissioner reserves the right to direct any inspection that is deemed necessary. The Contractor shall provide free access to the site for inspection activities.

E. The Contractor shall repair or remove items that are damaged due to the Contractor's activities. Repair, replacement and installation of damaged items shall be performed at no additional cost to the City of New York and to a condition at least equal to that which existed prior to start of work.

F. The Contractor shall coordinate the Work with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for reinforcing existing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition Work performed under this Contract. Contractor shall not overload any structural elements. The Contractor is responsible to provide the services of a New York State Licensed Professional Engineer to design, review, and seal the demolition design plans outlining the demolition means and methods and final post-demolition conditions as needed to complete the work safely and lawfully in accordance with DDC General Conditions.

1.6 PROJECT MEETINGS

A. PRE-DEMOLITION

1. The Contractor, along with all subcontractors, shall attend a pre-demolition meeting scheduled by the Commissioner prior to commencement of work to resolve questions pertaining to the work and to establish basic administrative procedures and schedules.

B. PROGRESS

1. Once demolition work has begun, the Contractor shall schedule, administer and attend meetings with the City of New York and Commissioner once a week or as deemed necessary by the Commissioner to maintain optimum degree of communications between interested parties. The Contractor shall include selected subcontractors at such times as their interests may be involved.

1.7 OCCUPANCY

A. Buildings adjacent to the site will maintain their present occupancy and function.

B. The Contractor shall take any and all measures necessary to protect persons and property from injury or damage due to demolition activities, as well as maintaining vehicle and pedestrian traffic around the demolition area. See Section 1.12 for additional protection requirements.

1.8 SALVAGED MATERIALS

A. The Contractor, upon receiving Notice to Proceed from the City of New York, shall assume ownership and responsibility for all materials indicated to be demolished and removed from the site.

B. The Contractor may remove items of salvageable value for his use as work progresses. The Contractor shall transport salvaged items from the site as they are removed. Under no circumstances shall salvaged items be stored or openly sold on-site.

1.9 VIBRATION MONITORING

A. The Contractor shall be responsible to provide third-party vibration monitoring during demolition activities. The Contractor shall submit a vibration monitoring plan to the Commissioner for review and approval. The seismometer shall be securely installed within the limits of the project site at locations closest to any structures which may be affected during demolition. The Commissioner may request additional monitoring points be installed by the Contractor at their discretion. The vibration monitoring shall be conducted remotely to alert the Commissioner and Contractor via email in the event that any of the thresholds described below have been exceeded.

B. During all demolition activities, the vibration limits in terms of Peak Particle Velocity (PPV) are as follows:

1. Threshold for Recording:

a. PPV = 0.1 inch per second

2. Threshold for Investigation:

a. PPV = 1.0 inch per second for frequencies > 20 Hz

b. PPV = 0.5 inch per second for frequencies < 20 Hz

3. 3. Maximum Allowable:

a. PPV = 2.0 inch per second

C. If the “Threshold for Investigation” is reached or exceeded, an alert will be sent to all parties, following which, ways to reduce vibrations will be discussed. If the “Maximum Allowable” limit is reached or exceeded, the particular demolition operation must immediately cease pending an exploration of ways to attenuate the vibrations.

D. The values described above are tentative and field conditions may require adjustments lower, if necessary, to protect nearby structures. In addition, these monitoring requirements are the minimum required. The Contractor shall establish all necessary monitoring measures as necessary to be informed of the conditions around the site and confirm that demolition activities are not adversely impacting surroundings structures. The Contractor shall be responsible to monitor conditions during demolition activities to verify that protection requirements specified herein are maintained.

E. The Contractor shall submit a monitoring plan consisting of monitoring point locations and method of monitoring for review and approval by the Commissioner prior to the start of demolition activities.

1.10 EXISTING UTILITIES

A. The approximate locations of existing utilities are shown on the Contract Drawings. All utility locations are approximate and additional utilities that are or may be impacted by the work, may exist. The Contractor shall be responsible for protecting all utilities during construction. All existing utilities shall be field-verified and any discrepancies reported to the Commissioner.

B. The Contractor shall preserve and protect existing utilities within the public right-of-way and those shown to remain on the Contract Drawings. The Contractor shall promptly repair or have repaired by applicable utility company any damage to utilities during demolition work at no cost to the City of New York.

C. The Contractor shall not interrupt existing utilities serving any adjacent facilities to remain, except when authorized in writing by the Commissioner. The Contractor shall provide temporary services during interruptions to existing utilities, as acceptable to the utility and the Commissioner.

1.11 TEMPORARY LIGHTING

A. The Contractor shall supply temporary security lighting for the project site from dusk to dawn for the duration of the work. The Contractor may supplement the temporary lighting specified herein with the existing site lighting as needed.

1.12 TEMPORARY SERVICES AND FACILITIES

A. The provision of temporary water, electricity, interior lighting, phone lines and all other services and facilities for demolition operations shall be the responsibility of the Contractor. The Contractor shall also provide all necessary services and facilities as required by DDC General Conditions and shall contact the appropriate utility companies to arrange for connections and permits. The Contractor shall be responsible for all utility company connection and disconnection fees.

B. If fire protection needs are not supplied by permanent facilities, the Contractor shall, in accordance with DDC General Conditions, install and maintain temporary fire protection facilities in compliance with such requirements, and at a minimum, in accordance with National Fire Protection Association, NFPA 241, "Standard for Safeguarding".

1.13 CONTRACT LIMIT LINE

A. The Contract Limit Line for demolition work is shown on the Contract Drawings. No equipment, materials, and/or trailers shall be kept or stored outside the Contract Limit Area.

1.14 PRE-DEMOLITION SURVEY

A. Prior to demolition, a pre-demolition survey shall be completed. The Contractor shall engage an independent third-party firm with a minimum of three years' experience in preparing pre-demolition surveys for similar projects. The survey firm shall photograph (in color) building faces, roadways, and other facilities to remain which are located adjacent to structures to be demolished. In addition, the survey shall include detailed written descriptions of the condition of the existing site features and buildings adjacent to the proposed demolition. The photographs shall be dated and describe the location and elements of the photograph. A copy of pre-demolition survey shall be furnished to Commissioner not less than 5 days prior to the start of demolition.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials are as specified on the Contract Drawings when applicable. See related sections for additional product specifications.

B. All related monitoring equipment shall be supplied by the Contractor.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PROJECT FENCING

A. The Contractor shall construct a temporary 8-ft high plywood fence with a swing gate at the locations shown on the Contract Drawings and as necessary to properly and safely secure building demolition operations in accordance with DDC General Conditions. No demolition work shall begin until the project site is secured and the fence is completely installed. Fencing shall remain in place as permanent fencing after project completion.

3.3 SOIL EROSION AND SEDIMENT CONTROL

A. The Contractor shall install all soil erosion and sediment control measures in accordance with the requirements indicated on the Contract Drawings.

B. The Contractor shall be responsible for maintaining all soil erosion and sediment control measures until the work under this Contract is completed. The Contractor shall install a temporary crushed stone wheel cleaning pad at the construction entrance/exits as shown on the Contract Drawings and keep all streets clear of dirt and sediment by cleaning of the streets as necessary during the course of the project. A silt fence is to be installed at the site as shown on the Contract Drawings. Inlet filter fabric protection shall be installed at all inlets.

3.4 TRAFFIC

A. Prior to commencement of demolition operations, the Contractor shall implement all vehicular and/or pedestrian traffic protection measures indicated or described on the Contract Drawing and in these Specifications and any other measures required by the New York City Building, Traffic, Police and Fire Departments before, during, and after the demolition project. Damage to any public roadway shall be repaired by the Contractor to the satisfaction of the appropriate City agencies at no cost to the City of New York.

B. Signs required shall be designed and installed in accordance with the requirements of the NYSDOT and NYCDOT Standard Specifications, latest revision, the Federal Highway Administration's "Manual on Uniform Traffic Control Devices for Streets and Highways" and "Standard Highway Signs".

3.5 EXTERMINATION

A. The Contractor shall employ a state-licensed pest control firm with at least 3 years professional experience with commercial and multi-family residential buildings and demolition/construction conditions to design and implement an Insect and Rodent Control Plan for removing rodents and other pests from the building to be demolished and from the immediate surrounding area in accordance with DDC General Conditions. Implementation of the Insect and Rodent Control Plan shall commence prior to the permit application procedure and be completed no later than 15 days prior to the scheduled start date for demolition. The plan shall be submitted to the Commissioner for review at least 10 days prior to the commencement of extermination work under this Contract.

B. The insect and rodent control plan shall address the following: the removal of rodents, insects and major pests anticipated to be encountered; bait type and bait setting procedures; rodent and pest removal procedures; containment and control of migration of rodents from the project site; and other necessary and required measures. Final certification by the Contractor's pest control firm verifying compliance with DDC General Conditions and that the building(s) are clean of all insects, rodents and major pests shall be submitted and received by the New York City Health and Building Departments prior to the scheduled demolition start date. The Commissioner shall be copied on all correspondences.

3.6 UTILITIES

A. GENERAL

1. Existing utilities service shall not be interrupted unless authorized in writing by the Owner of the utility. Any temporary interruption necessary shall be directly coordinated and supervised by utility company personnel. The Contractor shall provide temporary services during interruptions to existing utilities, as acceptable to the affected utility companies.

B. MAINTENANCE

1. The Contractor shall maintain and protect from damage all existing above and below ground utilities. This includes, but is not necessarily limited to, above ground utility lines and transformers, water lines, gas lines, storm lines and catch basins shown on the Contract Drawings.

2. The Contractor shall immediately repair or have repaired by the appropriate utility company any damage to utilities caused by the demolition work at no cost to the City of New York.

C. ABANDONMENT/REMOVAL

1. Disconnection, plugging and removal of utility services, and sewer lines and appurtenances is part of this work and shall be performed prior to building demolition. The Contractor shall identify all utilities and sewers on-site and determine if utility laterals to the buildings to be demolished are direct and exclusive to the building before disconnection is performed.

2. Prior to removal, all utilities and sewers shall be properly purged and evacuated of all residual gases, oils, etc. or de-energized in the case of electric, telephone or other communications services. All purging and testing shall be approved by local utility or sewer companies.

3. The Contractor or appropriate utility or sewer company (if required) shall seal and/or plug the ends of all utilities indicated to be abandoned and removed with blank plates or caps and new valves where necessary as determined by the Commissioner. All plugs shall be inspected by the appropriate utility or sewer company, as required, prior to backfilling.

4. All utility disconnections shall be performed no later than 15 days prior to the scheduled start of demolition and must precede the demolition permit application procedure.

3.7 POLLUTION CONTROLS

A. DUST

1. During demolition and debris removal operations, the Contractor shall continually use water and other suitable methods to minimize dust dispersion to the lowest practical level possible. Requests made by the City of New York, or the Commissioner regarding pollution controls shall be promptly implemented by the Contractor. The Contractor shall not use water when dangerous flooding or icing may occur. The Contractor shall comply with all requirements in the DDC General Conditions pertaining to environmental protection, soil erosion and dust control and install all control measures indicated on the Contract Drawings.

B. CLEANING

1. The Contractor shall maintain the cleanliness of streets and properties at all times by removing dirt, dust and debris produced by demolition operations. This shall be done on a daily basis. After demolition and debris removal is complete, the Contractor shall return adjacent structures and roadways to the conditions existing prior to the start of work. Power washing or other means deemed necessary by the Commissioner shall be implemented by the Contractor to achieve this objective. The Contractor shall provide enough refuse containers for collecting construction/ demolition debris throughout the duration of all work.

C. NOISE

1. The Contractor shall make all attempts necessary to reduce noise emissions from the site during demolition operations. Noise levels shall be maintained at or below state standards and/or as required herein. All machinery and equipment shall have mufflers or noise reducing devices installed.

3.8 LINE PURGING

A. The Contractor shall be responsible for safely purging all mechanical and plumbing lines and other related systems (including equipment) within the building that may contain residual oils, gases, etc. The collected materials shall be the sole responsibility of the Contractor who shall legally dispose of these materials in accordance with DDC General Conditions (if applicable) including but not necessarily limited to NYSDEC requirements. The dumping of these materials on-site shall not be permitted.

B. Pipe lines shall be drained or evacuated and residual materials collected in proper containers. Equipment shall be drained of oils, lubricants, coolants, (i.e., Freon, etc.) which shall be properly collected and disposed of prior to commencement of demolition activities.

3.9 DEMOLITION

A. The demolition work and safety procedures shall conform to the standards set forth in the Contract Documents including these Specifications and in the Demolition Safety Manual, latest revision, prepared by the National Demolition Association. Additionally, all cranes, concrete shears and other major pieces of demolition equipment utilized in the execution of the demolition work shall be thoroughly inspected by certified personnel on a monthly basis. Copies of the inspection reports shall be maintained on-site at all times and shall be made available to Commissioner immediately upon request.

B. Prior to commencement of any demolition operations, the Contractor shall verify that hazardous materials and asbestos-containing materials have been abated and removed from the buildings in accordance with DDC General Conditions. The Contractor is to coordinate with the New York City Building Department Officials or the Commissioner on the method of demolition.

C. Under no circumstances shall explosives or wrecking balls be used for any aspect of the demolition work.

D. Demolition shall proceed in such a manner that all debris falls away from adjacent buildings and all other structures including utilities that are to be maintained and protected.

E. Prior to building demolition, each floor shall be pre-stripped of all non-recyclable, solid waste materials and items such as partitions, cabinets, fixtures, and plaster/lathing, etc. and segregated for disposal by the Contractor.

F. Contractor shall coordinate with the New York City Building Department Officials and the Commissioner when determining methods of demolition to be used. All methods shall be in accordance with DDC General Conditions and industry standards.

G. Prior to the start of any structural demolition activities, Contractor shall submit documentation describing the methodology for removing the structural members and all temporary shoring requirements. The documentation shall be prepared by and signed and sealed by a licensed Professional Engineer in the State of New York. Contractor shall be responsible to complete the demolition work without disturbing, damaging, or otherwise impacting all the adjacent properties within close proximity to the site.

H. Any and all demolition methods and procedures employed by Contractor shall meet, at a minimum, the following criteria:

1. Demolition activities shall not disturb, damage or otherwise impacting buildings and structures adjacent to the site.

2. All demolition activities shall be performed in strict accordance with DDC General Conditions and standard practices applicable to the method of demolition used.

3. Demolition debris shall not be permitted to fall outside of the construction fence at any time during the demolition operations. If this should occur, Contractor shall stop work and modify the demolition method to prevent further incident.

3.10 DISPOSAL OF DEMOLISHED MATERIALS

A. GENERAL

1. The Contractor shall remove from the site all debris, rubbish and other materials resulting from demolition and shall safely and legally dispose of all these items in accordance with DDC General Conditions. Any testing that is required shall be the responsibility of the Contractor.

2. Recycling of demolition debris is strongly encouraged. All recycling must be done in accordance with all currently applicable New York State waste flow regulations and New York City requirements. All solid waste as defined by NYSDEC criteria shall be removed from the site in accordance with all currently applicable land disposal regulations.

3. Burning of any materials on-site shall not be permitted.

B. SUBMITTALS

1. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

2. The Commissioner’s review of Contractor submittals is limited to checking for general conformance with the design intent and does not relieve Contractor of its responsibility to perform the work in a safe manner and in strict accordance with the Contract Documents and DDC General Conditions.

3. A list of all anticipated waste streams and proposed disposal facilities for each waste shall be provided to the Commissioner prior to the start of work.

4. Written permission shall be obtained from the Commissioner on whose property the demolition material is to be disposed.

5. The Contractor shall provide manifests and/or bills of lading for each truck that exits the site with demolition material to the Commissioner. These manifests and/or bills of lading shall indicate the following:

   a. Date and time of departure from the demolition site.

   b. Truck I.D. number.

   c. Type of material carted off-site.

   d. Amount of material (in tons).

e. Final destination of the excess material.

f. Signature of representative at final destination accepting the demolition debris.

C. REMOVAL

1. The Contractor shall legally and safely transport and dispose off-site all materials removed from demolished structures in accordance with DDC General Conditions. The Contractor shall be responsible for locating and making arrangements for the safe, legal disposal of demolition material off-site during the entire course of the Contract.

3.11 SITE GRADING

A. At the conclusion of demolition, final grading shall match that shown on the Contract Drawings.

B. Refer to Section 310000 – Earthwork for backfill and compaction requirements and final grade tolerances.

3.12 PROJECT RECORD DRAWINGS

A. The Contractor shall mark in the field on a set of Contract Drawings all locations of removed and remaining building foundation elements and utility disconnections within the Contract Limits. Existing foundation size and locations and utility type, size, and depth-of-bury shall also be noted on this plan. The Contractor shall provide certifications from utility companies of complete and correct utility disconnections.

END OF SECTION 024116

SECTION 026200 - EXCAVATION AND DISPOSAL OF POTENTIALLY CONTAMINATED SOILS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract.

1.2 GENERAL REQUIREMENTS

A. When discovered during the performance of the Work, the Contractor must remove Contaminated Soils as needed.

B. Work of this section, as shown or specified, must be in accordance with the requirements of the Contract Documents and the New York City Building Code, United States Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation (NYSDEC), New York City Department of Environmental Protection (NYCDEP), the City of New York Department of Sanitation (DSNY), and the Occupational Safety and Health Administration (OSHA).

1.3 DEFINITIONS

A. Contaminated Soils: Refers to both Non-Hazardous Contaminated Soil and Hazardous soil, except as otherwise stated in this Specification.

B. Non-Hazardous Contaminated Soil: Soils with contaminant concentrations greater than NYSDEC Part 375 Commercial Soil Cleanup Objectives (SCOs).

C. Hazardous Soils: Soils showing exceedances of Toxicity Characteristic Leaching Procedure (TCLP) Regulatory Levels for Hazardous Waste published in Resource Conservation and Recovery Act (RCRA), 6 NYCRR Part 371, or 40 CFR Section 261.

1.4 SUMMARY

A. The following work elements are included in the scope of this Section:

1. Removal, Staging, Laboratory Analytical Testing, Characterization for Disposal, Manifesting, Transportation and Off-Site Disposal of excavated soils/materials from the Construction Area shown in Contract Drawings (see Appendix).
2. Transport and disposal of all cleaning/decontamination and personal protective equipment (PPE) wastes necessary for Contaminated Soils.
3. General excavation of Contaminated Soils to elevations and/or grades established within the Contract Drawings and as described herein.
4. Legal off-site disposal of contaminated excavated materials.

5. Temporary groundwater control of contaminated groundwater as required for execution of the Work of this Section and for all other related foundation Work.
6. All submittals required in subsection 1.8 of this Section.
7. All other labor, equipment, and materials, as well as any incidental services not specifically noted, as may be reasonably inferred to be required to make the Work under this Section complete.

B. The following work elements are not included in the scope of this Section:

1. Excavation of non-contaminated soils, fill placement, grading and compaction to required elevations for appurtenances and general site work as shown on the Contract Drawings.
2. Removal of non-contaminated unsuitable subgrade soils, replacement with approved fill and compaction as dictated by site conditions or as directed by the Commissioner.
3. Improvement of subgrade conditions via compaction, installation of geotextiles, and/or placement of approved fill as directed by the Commissioner.
4. Providing additional approved suitable material for filling and rough grading.
5. All temporary excavation support as required to achieve the work of this Section.
6. Protection of adjacent structures, utilities, and pavements.
7. Temporary groundwater control of non-contaminated groundwater as required for execution of the Work of this Section and for all other related foundation Work.

C. Related Documents:

1. Work governed by this section, as shown or specified, must be in accordance with the requirements of the Contract Documents and the New York City Building Code (latest edition), USEPA, NYSDEC, NYCDEP, DSNY, and OSHA.
2. Work of this Section, as shown or specified, must be in accordance with the Sediment and Erosion Control Plan.
3. Work of this Section, as shown or specified, must be in accordance with the Construction Waste Management Plan.

1.5 RELATED SECTIONS:

A. The following Sections contain requirements related to this Section:

1. Section 310000 - "Earthwork"
2. Phase II Environmental Site Investigation Report - (see Appendix)

1.6 STANDARDS AND REFERENCES:

A. The publications listed below are incorporated into this Specification without limitation and must be read as if printed herein. In the case of conflict between the referenced documents and the following text, the stricter requirements applies.

1. AMERICAN PETROLEUM INSTITUTE (API)

a. Supplement - Underground Spill Cleanup.
b. Bulletin 1628 - Manual Protection Against Ignitions Arising out of Static, Lightning and Stray Currents.

2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS

   a. D 3587-85 Classification of Soils for Engineering Purposes.

3. CODE OF FEDERAL REGULATIONS (CFR)
4. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

   a. NFPA 30 Flammable and Combustible Liquids Codes.
   b. NFPA 327 Recommended Practice for Handling Underground Leakage of Flammable and Combustible Liquids.

5. U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA)

   a. USEPA-SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Third Edition. November 1986.
   b. USEPA Standard Operating Guide. July 1988.
   c. USEPA Toxic Substance Control Act, 1976.
   d. 40 CFR 260 - 270 USEPA's Hazardous Waste Requirements.
   e. 40 CFR 136 Guideline for Establishing Test Procedures for Analysis of Pollutants.

6. MANIFESTING AND TRANSPORTING (DOT)

   a. 49 CFR Hazardous Materials Transportation Regulations.

7. NEW YORK STATE CODES RULES AND REGULATIONS (NYCRR)

   a. 6 NYCRR Part 360 Solid Waste Management Facilities.
   b. 6 NYCRR Part 371 Identification and Listing of Hazardous Wastes.

1.7 REGULATORY REQUIREMENTS

A. If the Contractor creates a spill, the spill must be reported by the Contractor to the Commissioner and the NYSDEC Spills hotline. The Contractor is responsible for managing the cleanup of any spills created by the Contractor. Relevant provisions of 6 NYCRR Part 375 and NYSDEC guidance DER-10 should be a source for Best Management Practices.

1.8 SUBMITTAL PROCEDURES

A. Refer To DDC General Conditions Section 013300 "Submittal Procedures".

1.9 SUBMITTALS

A. Include the following items in submittals as referenced below:

1. Material Handling Plan: The Contractor's Construction Waste Management Plan (specified in DDC General Conditions Section 017419 "Construction Waste Management and Disposal") must include a Material Handling Plan for work within the Construction Area, which details the Contractor's proposed soil screening plan, stockpiling plans, proposed soil sampling plans and laboratory analytical plans. The soil sampling plan should include sample location details, frequency of sampling, analytical schedule, environmental analytical laboratory, and proposed disposal facilities for any Contaminated Soil.
2. Health and Safety Requirements: The Contractor's Environmental Safety Plan (specified in DDC General Conditions Section 013526 "Safety Requirements Procedures") must include provisions for conducting work in the Construction Area.
3. The Contractor's Construction Waste Management Plan (specified in DDC General Conditions Section 017419 "Construction Waste Management and Disposal") submittal should include but not be limited to the following items:

    a. Proof of qualification credentials.
    b. Completed waste profiles for materials disposal and landfill acceptance letters.
    c. Copies of transport manifests.
    d. Stockpiled soil sampling results.
    e. Logs, reports, and record keeping, as required by the Commissioner.
    f. Bills of lading, Certified Weight Tickets.
    g. Landfill and disposal facility acceptance letters, permits and licenses.
    h. Transportation firm's permits and licenses.

B. Shop Drawings: Submit detailed shop drawings and calculations to be reviewed by the Commissioner. The drawings and calculations must be prepared by a Professional Engineer licensed in the State of New York. The submittals must include but not be limited to the following:

1. Contaminated Soil Excavation Limits (vertical and horizontal).

1.10 CONTAMINANTS:

A. Available soil sampling results are furnished with the Appendix. All Site soils are not considered Contaminated Soil, as defined above; however, some concentrations of metals were detected below the NYSDEC Commercial SCOs. Additionally, several volatile organic compounds (VOCs) were detected in the soil vapor samples collected at the Site which may indicate the presence of contamination. The Contractor must be prepared to work with any materials, as necessary, and at all levels of OSHA-mandated personal protection and instruction requirements.

1.11 PERMITS AND CERTIFICATIONS:

A. The Contractor is responsible for performing waste determinations, proper on-site management, and obtaining all of the necessary Federal, State, and local permits required for Contaminated Soil excavation, removal, and transport. In the event that a USEPA Hazardous Waste Identification Number is required for soil transport and disposal, the Contractor shall be responsible for obtaining the USEPA Generator identification number and the Contractor is responsible for obtaining all other necessary licenses and permits. The Contractor must also provide all associated transport and final manifests. The Contractor is considered the generator of all non-hazardous waste materials and signs all hazardous and non-hazardous manifests. Prior to disposal, the Contractor must submit waste characterization sampling results, waste profile sheets, landfill acceptance letter(s) and the certifications of any facility proposed to be selected for disposal of waste for Commissioner review and approval.

1.12 LOGS, REPORTS, AND RECORD KEEPING:

A. The following logs, reports, and records shall be developed, retained, and submitted by the Contractor to the Commissioner and/or entitled regulatory agencies upon request (unless otherwise noted in previous sections):

1. Instruction logs, including employees' printed names and signatures, in addition to instruction subject and date or copy of applicable instruction certificate;
2. Daily safety inspection logs;
3. Employee/visitor/register;
4. Medical opinions/certifications;
5. Environmental and personal exposure monitoring records;
6. Phase out reports (final documentation verification certificates, summary of air monitoring data, final medical certificates, etc.) and a copy of all State licensing certificates required to conduct all required activities
7. Sampling logs and drawings showing sample IDs and locations.
8. All laboratory reports for waste characterization testing.
9. All landfill acceptances of each waste stream.
10. All waste transporter and final disposal manifests.

B. All personnel exposure and medical monitoring records must be maintained in accordance with applicable OSHA standards, 29 CFR 1910 and 1926 (including OSHA 200 log and accident/first aid reports).

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 MOBILIZATION AND DEMOBILIZATION:

A. Mobilize all personnel, supplies, and equipment to the project site. Mobilization will consist of:

1. The delivery to the site of all labor, equipment and materials needed to the job site;
2. Complete assembly in satisfactory working order of all such equipment on the site.
3. All site equipment will be properly decontaminated prior to being delivered to the site.
4. All site equipment will be properly decontaminated prior to being removed from the site.
5. All wastes generated from this decontamination process (i.e., rinse water and sediment) will be characterized and disposed of or treated on-site by the Contractor at no additional cost to the City of New York.

B. Demobilization consists of the removal from the site of all equipment and surplus materials after completion of the work.

3.2 CONSTRUCTION AREA SOIL EXCAVATION REQUIREMENT

A. The Contractor is responsible for the identification and protection of all utilities.

B. The Contractor is responsible for sloping, benching or otherwise shoring deeper excavation areas, as necessary, in accordance with applicable New York State and OSHA regulations (New York State Code Rule 753, OSHA Part 1926).

C. All soils that will be excavated must be properly characterized in accordance with Paragraph 3.5 of this Section and the Appendix by the Contractor. The Contractor must provide a qualified environmental technician to perform the sampling. All sampling will be conducted with the Commissioner present.

D. Keep contaminated material stockpiles segregated from non-contaminated material stockpiles. Excavation and stockpiling operations for the different materials must not be mixed.

E. The Contractor is responsible for implementing any run-off controls necessary to minimize run-off from entering excavations. Standing water from precipitation events in excavations must be handled in accordance with DDC General Conditions .

F. Develop and implement a Community Air Monitoring Plan (CAMP) as part of the Contractor's Safety Plan (specified in DDC General Conditions Section 013526 "Safety Requirements Procedures") in accordance with NYSDEC DER-10 Guidance. The CAMP must require real-time monitoring for VOCs and particulates (i.e., dust) at the downwind perimeter of the Construction Area, when soil disturbance activities are in progress. The CAMP is intended to provide a measure of protection for the downwind community from potential airborne contaminant releases as a direct result of work activities in the Construction Area.

G. Employ dust control methods during soil excavation, stockpiling, loading, etc., activities as described in DDC General Conditions Section 011000 "Summary" and in compliance with the CAMP. Use water or water amended with an appropriate surfactant, used in accordance with the manufacturer's recommendations, or other means to control dust that is acceptable to the Commissioner. No visible dust is permitted beyond the project work limits as a result of excavation activities, as determined by the Commissioner.

H. Do not load excavated soil into the vehicles/containers when it is raining heavily and the soil in the work area is saturated with water.

I. The Contractor is responsible for providing adequate protection against erosion during all field activities.

3.3 REMOVAL OF CONTAMINATED SOIL:

A. Excavation, management, and disposal of Contaminated Soils must be conducted in accordance with the procedures and requirements of this Section.

3.4 SOIL SCREENING

A. Excavated materials and excavations will be evaluated as the excavation work progresses based upon visual and olfactory evidence of impacts. VOC field screening will be performed if visual or olfactory evidence of contamination is suspected. VOC field screening methods is to include the use of a photo-ionization detector (PID) equipped with a standard 10.6 eV bulb capable of measuring relative concentrations of ionizable VOCs with ionization potentials up to 10.6 eV. Soil screening for visible, olfactory, and PID evidence of contamination will be conducted by and observed by the Commissioner, as work progresses.

B. Soil from excavation areas will be screened and transported to a soil staging area approved by the Commissioner.

C. All soil stockpiles will be characterized by the Contractor for landfill disposal requirements in accordance with Section 3.5 A below.

3.5 DISPOSAL CHARACTERIZATION:

A. Collect soil samples from the stockpiles as required by the disposal facility(s) selected by the Contractor. Disposal characterization frequency must be as required by the disposal facility and in accordance with the approved Waste Management Plan (specified in DDC General Conditions Section 017419 "Construction Waste Management and Disposal"). Provide an environmental technician to collect, package and ship soil samples to an approved independent laboratory. All expenses related to collection, packaging, shipping, and analysis of soil samples must be the responsibility of the Contractor.

3.6 TRANSPORT AND DISPOSAL:

A. Comply with all federal, state, and local regulations regarding transportation and disposal of hazardous and nonhazardous material, including, but are not limited to:

1. Trucks used for transportation of hazardous material for disposal off site are permitted pursuant to 6 NYCRR Part 364 and City of New York trucking requirements;
2. Vehicle operator possession of a commercial driver's license with hazardous materials endorsement;
3. Registration of vehicles as a hazardous waste carrier;
4. Utilization of shipping papers and/or hazardous waste manifests (40 CFR 262.20);
5. Proper marking and placarding of vehicles;
6. Placement of emergency response procedures and emergency telephone numbers in vehicle, and operator familiarity with emergency response procedures; and, Compliance with load height and weight regulations.

B. Coordinate with the Commissioner who will sign waste manifests.

C. Complete all required manifest forms and Bill of Lading forms to document proper transportation and disposal of materials off site and submit the documents with signatures from the receiving facility - refer to DDC General Conditions.

END OF SECTION 026200

SECTION 02 80 13 – GENERAL CONTRACTOR WORK
NOVEMBER 2017 VERSION

ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

1.01 SCOPE FOR ASBESTOS ABATEMENT WORK

A. The "General Conditions" apply to the work of this Section.

B. The asbestos abatement contractor shall remove asbestos containing materials as needed to perform the other work of this Contract when discovered during the course of work. When required, the asbestos abatement contractor shall replace the ACM with non-asbestos containing materials. An allowance of **$15,000.00** for the **General Contractor** is herein established for this incidental work when so ordered and authorized by the Commissioner.

C. All work shall be done in accordance with the applicable provisions of the rules and regulations of the asbestos control program as promulgated by Title 15 Chapter I of RCNY and New York State Department of Labor Industrial Code Rule 56 cited as 12 NYCRR Part 56, whichever is more stringent as per latest amendments to these laws and as modified herein by these specifications.

D. All disposal of asbestos contaminated material shall be per Local Law 70/85.

E. The asbestos abatement contractor's attention is directed to the fact that certain methods of asbestos abatement are protected by patents. To date, patents have been issued with respect to "negative pressure enclosure" or “negative-air” or "reduced pressure” and "glove bag".

F. The asbestos abatement contractor shall be solely responsible for and shall hold the Department of Design and Construction and the City harmless from any and all damages, losses and expenses resulting from any infringement by the asbestos abatement contractor of any patent, including but not limited to the patents described above, used by the asbestos abatement contractor during performance of this agreement.

G. "Asbestos" shall mean any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthrophyllite and actinolite.

H. Prior to starting, the asbestos abatement contractor must notify the Commissioner of the Department of Design and Construction if he/she anticipates any difficulty in performing the Work as required by these Specifications. The asbestos

abatement contractor is responsible to prepare and submit all filings, notifications, etc. required by all City, State and Federal regulatory agencies having jurisdiction.

The asbestos abatement contractor is responsible for submitting the Asbestos Project Notification Form (ACP-7 Form) to the Department of Environmental Protection, Asbestos Control Program, as per Title 15, Chapter I of RCNY and to the NYSDOL as per Industrial Code Rule 56.

The asbestos abatement contractor is responsible for preparing, and submitting Asbestos Variance Application (ACP-9). If a Variance is required, the asbestos abatement contractor is responsible to retain a NYSDOL Asbestos Project Designer, as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required variance.

The general contractor is responsible for preparing and submitting an Asbestos Abatement Permit and/or Work Place Safety Plans (WPSP) that may be required for the completion of the Contract or incidental work. If such plans are required, the general contractor is responsible for retaining a registered design professional as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required plans.

The asbestos abatement contractor is responsible for the submission of all required documents to the NYCDEP to acquire the appropriate Asbestos Project Conditional Closeout (ACP-20) and/or Asbestos Project Completion Forms (ACP-21) on a timely basis for the completion of the incidental work encountered under this contract.

The asbestos abatement contractor will be required to attend an on-site job meeting with the Construction Project Manager prior to the start of work to examine conditions and plan the sequence of operations, etc.

The asbestos abatement contractor shall have a NYSDOL/NYCDEP Asbestos Supervisor onsite to oversee the work and conduct a final visual inspection as required by both Title 15, Chapter 1 of the RCNY and NYSDOL Industrial Code Rule 56.

I. All work shall be done during regular working hours unless the asbestos abatement contractor requests authorization to work in other then regular working hours and such authorization is granted by the Commissioner. (Regular work hours are those hours during which any given facility, in which work is to be done, is customarily open and functioning, normally between the hours of 8:00 A.M. and 4:00 P.M. Monday - Friday.) If such work schedule is authorized by the Commissioner, the work shall be done at no additional cost to the City.

J. The Commissioner may order that work be done in other than regular working hours as herein by defined and this order may require the asbestos abatement

contractor to pay premium or overtime wages to complete the work. If the Commissioner orders work in other than regular working hours, the asbestos abatement contractor shall multiply the unit price for that portion of the work requiring premium wages by 1.50 when computing payment in accordance with Paragraph 1.09. All requests for premium payment must be supported by certified payroll sheets and field sheets approved by the Construction Project Manager.

1.02 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

A. Requirements: The asbestos abatement contractor must be approved through the Department's Request for Subcontractor Approval, administered by the Agency Chief Contracting Office (ACCO), Vendor Integrity Unit. The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (6) below. Such documentation shall include without limitation, all required licenses, certificates, and documentation.

1. The asbestos abatement contractor must, whether an individual, corporation, partnership, joint venture or other legal entity, demonstrate for the three year period prior to the work that it has been licensed by the New York State Department of Labor (NYSDOL), as an "Asbestos Abatement Contractor". The asbestos abatement contractor shall submit copies of the asbestos abatement contractors NYSDOL License for the past three years

2. The asbestos abatement contractor must, for the three-year period prior to the work, have been in the business of providing asbestos abatement services as a routine part of its daily operations.

3. The asbestos abatement contractor proposing to do asbestos abatement work must be thoroughly experienced in such work and must submit a list of five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least $1,000,000 in each of the three years.

4. For each project submitted to meet the experience requirements set forth above, the asbestos abatement contractor must submit the following information for the project; name and location of the project; name title and telephone number and email address of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work; brief description of the scope of work completed as a prime or sub-asbestos abatement contractor; amount of contract or subcontract and the date of completion.

5. The asbestos abatement contractor must demonstrate that it has the financial resources, certified supervisory personnel and equipment

necessary to carry out the work and to comply with the required performance schedule, taking into consideration other business commitments. The asbestos abatement contractor must submit such documentation as may be required by the Department of Design and Construction to demonstrate that it has the requisite capacity to perform the required services of this contract. The Department may also conduct an inspection of the asbestos abatement contractor's facility to verify if the contractor has equipment and staffing to perform the work.

6. The asbestos abatement contractor must submit a copy of their Corporate Health and Safety Plan for review and acceptance. A Job Hazard Analysis (JHA) for the specific work conducted must be included.

B. Throughout the specifications, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics thereof. Provide materials or workmanship that meet or exceed the specifically named codes or standards where required by these specifications.

C. Site Investigation: Asbestos abatement contractor shall inspect all the specifications and related drawings, and will investigate and confirm the site conditions affecting the work, including, but not limited to (1) through (5) below. The asbestos abatement contractor will attend a walkthrough site inspection with the department's Project Manager and the Third-Party Air Monitor prior to the work. Such walkthrough will be scheduled at the Department's convenience.

1. Physical considerations and conditions of both the material and structure. These considerations include any obstacles or obstructions encountered in accessing or removing the material.

2. Handling, storage, transportation and disposal of the material.

3. Availability of qualified and skilled labor.

4. Availability of utilities.

5. Exact quantities of all materials to be disturbed and/or removed

1.03 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

The asbestos abatement contractor will visit the subject location within one (1) working day of notification to ascertain actual work required. If the project is identified as being "urgent", then work shall commence no later than 48 hours from the time of notification. In this event, the asbestos abatement contractor shall immediately notify when applicable EPA NESHAPS Coordinator, NYSDOL Asbestos Control Bureau and NYCDEP

Asbestos Control Program of start of the work and file the necessary Asbestos Notifications and any applicable Variance Applications with the regulatory agencies cited above.

In the event that the project is not classified as "urgent" the asbestos abatement contractor shall notify the EPA NESHAPS Coordinator, NYSDOL and NYCDEP by submitting the requisite asbestos project notification forms, postmarked 10 days before activity begins if 260 linear feet or more and/or 160 square feet or more of asbestos containing material will be disturbed.

The following information must be included in the notification:

A. Name and address of building City or operator;

B. Project description:

1. Size - square feet, number of linear feet, etc;

2. Age - date of construction and renovations (if known);

3. Use - i.e., office, school, industrial, etc.

4. Scope - repair, demolition, cleaning, etc.

C. Amount of asbestos involved in work and an explanation of techniques used to determine the amount;

D. Building location/address, including Block and Lot numbers;

E. Work schedule including the starting and completion dates;

F. Abatement methods to be employed;

G. Procedures for removal of asbestos-containing material;

H. Name, title and authority of governmental representative sponsoring project.

1.04 WORK INCLUDED IN UNIT PRICE

The asbestos abatement contractor will be paid a basic unit price of **$25.00** per square feet for the removal and disposal of asbestos containing material and replacement of the same with non-asbestos containing materials.

Unit price shall include all costs necessary to do the work of this Contract, including but not limited to: labor, materials, equipment, utilities, disposal, insurance, overhead and profit.

1.05 AIR MONITORING – ASBESTOS ABATEMENT CONTRACTOR

A. "Air Sampling" shall mean the process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400 or the provisional transmission electron microscopy methods developed by the USEPA and/or National Institute of Standard and Technology which are utilized for lower detectability and specific fiber identification.

B. Air monitoring of asbestos abatement contractor's personnel will be performed in conformance with OSHA requirements, (All costs associated with this work are deemed included in the unit price.).

C. Qualifications of Testing Laboratory:

The industrial hygiene laboratory shall be a current proficient participant in the American Industrial Hygiene Association (AIHA) PAT Program. The laboratory identification number shall be submitted and approved by the City. The laboratory shall be accredited by the AIHA and New York State Department of Health Environmental Laboratory Approval Program (ELAP).

Note: Work area air testing and analysis before, during and upon completion of work (clearance testing) will be performed by a Third Party Air Monitor under separate Contract with the City.

1.06 THIRD PARTY MONITORING AND LABORATORY

A. The NYCDDC, at its own expense, will employ the services of an independent Third Party Air Monitoring Firm and Laboratory. The Third Party Air Monitor will perform air sampling activities and project monitoring at the Work Site.

B. The Laboratory will perform analysis of air samples utilizing Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM).

C. The Third Party Air Monitoring Firm and the designated Project Monitor shall have access to all areas of the asbestos removal project at all times and shall continuously inspect and monitor the performance of the asbestos abatement contractor to verify that said performance complies with this Specification. The Third-Party Air Monitor shall be on site throughout the entire abatement operation.

D. The NYCDDC will be responsible for costs incurred with the Third Party Air Monitoring Firm and laboratory work. Any subsequent additional testing required due to limits exceeded during initial testing shall be paid for by the asbestos abatement contractor.

1.07 PAYMENT REQUEST DOCUMENTATION

B. The following information shall be included for each payment request:

1. Description of work performed.
2. Linear footage and pipe sizes involved.
3. Square footage for boiler & breaching insulation removed.
4. Square footage of non pipe and boiler areas removed, patched, enclosed, sealed, or painted.
5. Square footage of encapsulation, sealing, patching, and painting involved.
6. Total cost associated with compliance with the assigned task.
7. Architectural, Electrical, HVAC, Plumbing, etc. work incidental to the Asbestos Abatement Work.
8. A certified copy (in form 4312-39) to the Comptroller or Financial Officer of the New York City to the effect that the financial statement is true.
9. A signed copy (in form 6506q-6) of certificate of compliance with non-discriminatory provisions of the Contract.
10. Attach a copy of valid workmen compensation insurance.
11. Valid asbestos insurance per occurrence.
12. General liability insurance when required.

C. Each payment request shall include a grand total for all work completed that billing period, the landfill waste manifests and a copy of waste transporter permit. The Department of Design and Construction will inspect the work performed, review the cost and approve or disapprove requests for payment.

D. EXPOSURE LOG: With this final payment, the asbestos abatement contractor shall submit a listing of the names and social security numbers of all employees actively engaged in the abatement work of this Contract. This list shall include a summary showing each part of the abatement work in which the employee was engaged and the dates thereof.

1.08 QUANTITY CALCULATIONS

In order to determine the square footage involved for the various pipe sizes of pipe insulation that might be encountered, the following table is to be used.

PIPE INSULATION SIZE O.D.	PIPE SIZE O.D.	SQUARE FOOTAGE PER LINEAR FOOT
2-1/2"	1/2"	0.65
2-3/4"	3/4"	0.72
3"	1"	0.79
3-1/4"	1-1/4"	0.85
3-1/2"	1-1/2"	0.92
4"	2"	1.05
4-1/2"	2-1/2"	1.18
5”	3”	1.31
6"	3-1/4"	1.57
7"	3-1/2"	1.83
8"	4"	2.09
9”	5"	2.36
10"	6"	2.62
12"	8"	3.14
14"	10"	3.67
16"	12"	4.19
18"	l4”	4.71

1.09 METHOD OF PAYMENT

Payment shall be made in accordance with Items A through R below. Payment shall be calculated based on the actual quantity of the item performed by the asbestos abatement contractor, times the unit price specified below. Credits may apply to certain times, as specified below.

A. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING PIPE INSULATION:** Actual linear footage, multiplied by the square footage factor listed for the respective pipe size in Section 1.08, multiplied by the unit price in Section 1.04.

EXAMPLE: 100 lin.ft. of 1/2" pipe and 100 lin.ft. of 6" pipe, including elbows, tees. Flanges, etc.

100 X 0.65 = 65 sq.ft. 65 x unit price = Payment

100 X 2.62 = 262 sq.ft. 262 x unit price = Payment

B. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER INSULATION:** (all types including Silicate Block and including the removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

EXAMPLE: Item B. removal and replacement of 1000 S.F. of boiler insulation (incl. Silicate block)

1000 S.F. X (1.5) X the Unit Price = Payment

C. **REMOVAL, DISPOSAL AND REPLACEMENT OF TANK INSULATION:** (all types including removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

D. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER UPTAKE, & BREACHING INSULATION:** (all types including stiffening angles and wire lath) Payment shall be made at 2.0 times the unit price per square foot.

E. **REMOVAL, DISPOSAL AND REPLACEMENT OF DUCT INSULATION:** Payment shall be made at 1.0 times the unit price per square foot.

F. **REMOVAL, DISPOSAL AND REPLACEMENT OF SOFT ASBESTOS CONTAINING MATERIAL:** (Including sprayed-on fire proofing and sound proofing) Payment shall be made at 1.0 times the unit price per square foot of surface area. Area of irregular surfaces must be calculated and confirmed with DDC representative.

G. **ACOUSTIC PLASTER REPAIR AND/OR ENCAPSULATION:** Payment shall be made at 0.5 times the unit price per square foot.

H. **PATCHING OR REPAIR** of items listed in A through F will be paid at 0.33 times the unit price per square foot.

I. **REMOVAL, DISPOSAL AND REPLACEMENT OF WATERPROOFING ASBESTOS CONTAINING MATERIAL: (**including friable and non-friable waterproofing material from interior and exterior walls, floors, foundations, penetrations, louvers, vents and openings other than windows, doors and skylights) Payment shall be made at 0.5 times the unit price per square foot.

J. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING ELECTRICAL WIRING INSULATION:** (including friable and non-friable wiring insulation) Payment shall be made at 0.33 times the unit price per square foot.

K. **PAINTING:** Payment shall be made at 0.05 times the unit price per square foot.

L. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING PLASTER:** from ceilings and walls, including any wire lath and disposal as asbestos containing waste. Payment shall be made at 0.80 times the unit price per square foot.

M. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING FLOOR TILES, CEILING TILES, TRANSITE PANELS:** (including any adhesive, glue, mastic and/or underlayment) and disposal as asbestos containing waste. Payment shall be made at 0.40 times the unit price per square foot. If multiple layers are discovered, each additional layer shall be paid at 0.20 times the unit price per square foot.

N. **ADDITIONAL CLEAN UP/HOUSEKEEPING OF WORK AREA:** (excluding pre-cleaning of work area required by regulations) HEPA vacuuming and wet cleaning of asbestos contaminated surface. Payment shall be made at 0.20 times the unit price per square foot. When GLOVE BAG is employed to remove ACM, cost of HEPA vacuuming and wet cleaning of floor area up to 3 feet on each side of glove-bag shall be included in unit price and no extra payment will be made.

O. **REMOVAL, DISPOSAL OF ASBESTOS-CONTAINING ROOFING MATERIAL:** including mastic, flashing and sealant compound and provide temporary asbestos-free roof covering consisting of one layer of rolled roofing paper sealed with asphaltic roofing compound. Payment shall be made at 0.8 times the unit price per square foot. Credit at a rate of 0.33 times the unit price will be taken for each square foot of temporary roof covering which the asbestos abatement contractor is directed not to install.

P. **PICK-UP AND DISPOSAL OF GROSS DEBRIS:** (excluding any waste generated from abatement under Item A-R) at a rate of $150 per cubic yard for asbestos contaminated waste and $75 per cubic yard for non-asbestos contaminated waste. This cost includes all labor and material cost associated with work.

Q. **REMOVAL OF ASBESTOS-CONTAINING BRICK, BLOCK, MORTAR, CEMENT OR CONCRETE:** along with all surfacing materials including wire lath and/or other supporting structures and disposal as ACM waste. Payment shall be made at a rate of $25.00 per cubic foot of material removed.

R. **REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING WINDOW/DOOR CAULKING:** including friable and non-friable caulking, weather-stripping, glazing, sealants or other waterproofing materials applied to windows, doors, skylights, etc. Payment shall be made at the rate of $400.00 per opening regardless of size or configuration. This cost includes labor, consumable materials, set-up/breakdown, removal and disposal, as required.

Note 1: CREDIT: For items listed in A through F, a credit at a rate of 0.33 times the unit price, times the respective multiplier (for each item) will be taken for each square foot of insulation which the asbestos abatement contractor is not directed to reapply.

Note 2: MINIMUM PAYMENT: The minimum payment per call at any individual job sites or various job sites during the same day will be eight hundred dollars ($800.00).

Note 3: All payments shall be made as described in paragraph 1.09 herein**.**

Note 4: WORKING HIGHER THAN 12 FEET ABOVE FLOOR LEVEL OR WORK REQUIRING COMPLEX SCAFFOLDING OR CONSTRUCTION WORK PLATFORMS: Provisions are made in this Contract to compensate the asbestos abatement contractor for work performed in locations that are difficult to access due to

work at elevations that are significantly higher than the normal work level. The unit price for these items will be paid at 1.20 times the unit price described in Paragraphs 1.09, A through R for those portions of the work that are more than twelve (12) feet above the grade for that would be judged as the normal working level.

1.10 GUARANTEE

A. Work performed in compliance with each task shall be guaranteed for a period of one year from the date the completed work is accepted by the Department of Design and Construction.

B. The Commissioner of The Department of Design and Construction will notify the asbestos abatement contractor in writing regarding defects in work under the guarantee.

1.11 OCCUPANCY OF SITE NOT EXCLUSIVE

Attention is specifically drawn to the fact that contractors, performing the work of other Contracts, may be brought upon any of the work sites of this Contract. Therefore, the asbestos abatement contractor shall not have exclusive rights to any site of his work and shall fully cooperate and coordinate his work with the work of other contractors who may be brought upon any site of the work of this Contract. This paragraph applies to those areas outside the regulated Work Area as defined by Title 15, Chapter I of RCNY.

1.12 SUBMITTALS

A. Pre-Construction Submittals:

1. Attend a pre-construction meeting scheduled by the City of New York Department of Design and Construction. This meeting shall also be attended by a designated representative of the City of New York third party air monitoring firm, facility manager and the Construction Project Manager. At this meeting, the asbestos abatement contractor shall present three copies of the following items:
   a. asbestos abatement contractor’s scope of work, work plan and schedule.

   b. Asbestos project notifications, approved variances and plans to Government Agencies.

   c. Copies of Permits, clearance and licenses if required.

   d. Schedules: the asbestos abatement contractor shall provide to the Construction Project Manager a copy of the following schedules for approval. Once approved, schedules shall be maintained and updated as received. asbestos abatement contractor shall post a copy of all schedules at the site:

(1) A construction schedule stating critical dates of the project including, but not limited to, mobilization, Work Area preparation, demolition, gross removal, fine cleaning, encapsulation, inspections, clearance monitoring, and phase of refinishing and final inspections. The schedule shall be updated biweekly, at a minimum.

(2) A schedule of staffing stating number of workers per shift per activity, name and number of supervisor(s) per shift, shifts per day, and total days to be worked.

(3) Submit all changes in schedule or staffing to the Construction Project Manager prior to implementation.

e. Written description of emergency procedures to be followed in case of injury or fire. This section must include evacuation procedures, source of medical assistance (name and telephone number to nearest hospital) and procedures to be used for access by medical personnel (examples: first aid squad and physician). NOTE: Necessary Emergency Procedures Shall Take Priority Over All Other Requirements of These Specifications.

f. Safety Data Sheets (SDS) for encapsulants, sealants, firestopping foam, cleaners/disinfectants, spray adhesive and any and all potentially hazardous materials that may be employed on the project. No work involving the aforementioned will be allowed to proceed until SDS are reviewed.

g. Worker Training and Medical Surveillance: The asbestos abatement contractor shall submit a list of the persons who will be employed by him /her to perform the removal work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.

h. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.

(1) The asbestos abatement contractor shall provide a permanently bound log book of minimum 8-1/2” x 11” size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book shall contain on title page the project name, name, address and phone number of the asbestos abatement contractor; name, address and phone number of asbestos abatement contractor and City’s third party air monitoring firm; emergency

numbers including, but not limited to local Fire/Rescue Department. Log book shall contain a list of personnel approved for entry into the Work Area.

(2) All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted. Any significant events occurring during the abatement project shall be entered into the log. Upon completion of the job, the asbestos abatement contractor shall submit the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.

i. Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of ACM, understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.

B. During Construction Submittals:

1. Security and safety logs showing names of person entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.

2. Progress logs showing the number of workers, supervisors, hours of work and tasks completed shall be submitted daily to the Construction Project Manager.

3. Floor plans indicating asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager.

4. All asbestos abatement contractors' air monitoring and inspection results.

C. Project Closeout Submittals:

Upon completion of the project and as a condition of acceptance, the asbestos abatement contractor shall present two copies of the following items, bound and indexed:

1. Lien Waivers from asbestos abatement contractor, sub-asbestos abatement contractors and Suppliers,

2. Daily OSHA air monitoring results,

3. All Waste Manifests (Asbestos and Construction Debris), seals and disposal logs,

4. Field Sign-In/Sign-Out Logs for every shift,

5. Copies of all Building Department Forms and Permits,

6. A Letter of Compliance stating that all the work on this project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations,

7. All Warranties as stated in the Specifications,

    a. Fully executed disposal certificates and transportation manifest.

8. Project Record: The asbestos abatement contractor shall maintain a project record for all small and large asbestos projects. During the project, the project record shall be kept on site at all times. Upon completion of the project, the project record shall be maintained by the building owner. The project record shall be submitted to DDC as part of the close out documents. The project record shall consist of:

    a. Copies of licenses of all asbestos abatement contractors involved in the project;

    b. Copies of NYCDEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;

    c. Copies of all project notifications and reports filed with NYCDEP, NYSDOL and USEPA for the project, with any amendments or variances;

    d. Copies of all asbestos abatement permits, including associated approved plans and work place safety plan;

    e. A copy of the air sampling log and all air sampling results;

    f. A copy of the abatement asbestos abatement contractor’s daily log book;

    g. Copies of all asbestos waste manifests;

    h. A copy of all Project Monitor’s Reports (ACP-15).

i. A copy of each ATR-1 Form completed for the asbestos project (if required).

j. A copy of each Asbestos Project Conditional Closeout Report (ACP-20) if required.

k. A copy of the Asbestos Project Completion Form (ACP-21).

1.13 PROTECTION OF FURNITURE AND EQUIPMENT

Cover all furniture and equipment that cannot be removed from Work Areas. Movable furniture and equipment will be removed from Work Areas by the asbestos abatement contractor prior to start of work. At the conclusion of the work (after final air testing), the asbestos abatement contractor will remove all plastic covering on walls, floors, furniture, equipment and reinstall furniture and equipment. He shall remove and store all sheaths, curtains and drapes, and reinstall same following final clean up.

1.14 UTILITIES

A. General:

All temporary facilities shall be subject to the approval of the Commissioner. Prior to starting work at any site, locations and/or sketches (if required) of temporary facilities must be submitted to the Construction Project Manager for the required approval.

B. Water:

The Department of Design and Construction will furnish all water needed for construction, at no cost to the asbestos abatement contractor in buildings under their jurisdiction. However, it is the responsibility of the asbestos abatement contractor to ensure that hot water is provided for showering in the decontamination unit. The asbestos abatement contractor shall furnish, install and maintain any needed equipment to meet these requirements at his own expense.

C. Electricity:

The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the asbestos abatement contractor in a building, under their jurisdiction. The asbestos abatement contractor is responsible for routing the electric power to the abatement Work Area.

All temporary lighting and temporary electrical service for Work Area shall be in weatherproof enclosures and be ground fault protected.

D. In leased spaces, arrangements for water supplies and electricity must be made with the landlord. However, all such arrangements must be made through and are subject to approval of the Department of Design and Construction. Utilities will be provided at no cost to the asbestos abatement contractor. However, it is the asbestos abatement contractor's (or the general contractor's) responsibility to furnish and install a suitable distribution system to the Work Area. This system will be provided at no cost to the City.

1.15 FEES

The asbestos abatement contractor shall be responsible for any and all fees or charges imposed by Local, State or Federal Law, Rule and Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the date of the Bid opening.

END OF SECTION

SECTION 02 82 13
NOVEMBER 2017 VERSION

ASBESTOS ABATEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Contract Documents are as defined in the "Agreement". The General Conditions shall apply to all Work of this Section.

B. Work specified herein shall be the removal and disposal of Asbestos-Containing Materials (ACM) and asbestos-contaminated materials from designated areas of the Rego Park Community Library, located at 91-41 63rd Drive, Queens, NY 11374.

C. The following documents were reviewed and utilized to generate this abatement design specification which serves to locate and quantify the amount of ACM, and asbestos contaminated material, to be abated in support of this project.

1. A set of drawings (100% Construction Documents) labeled "Rego Park Community Library", dated 09/02/2022, prepared by Weiss / Manfredi;
2. Asbestos Survey Report performed by WSP title "Rego Park Community Library, New Facility", dated 12/08/2022.

D. The phasing and scheduling of work for this project shall be coordinated with and approved by the Construction Project Manager and Facility Manager. The Construction Project Manager and Facility Manager will make the final determination on all issues under this Contract covered by this Specification.

1.02 SCOPE OF WORK

A. The asbestos abatement contractor is to provide all labor, materials, equipment, services, testing, appurtenances, permits and agreements necessary to perform the work required for the abatement of ACM as required by these contract documents. All work shall be performed in accordance with this Specification, EPA regulations, OSHA regulations, New York City Local Law 70, Title 15, Chapter 1 RCNY, New York State Industrial Code 56, NIOSH recommendations, and any other applicable federal, state or local government regulations. Whenever there is a conflict or overlap of the above references, the most stringent provisions are applicable.

B. The intent of this Specification section is to ensure that the asbestos abatement contractor is responsible for the following:

1. Abatement of all ACM.

2. Cleaning and decontamination of the entire affected area.

3. Demolition that may be required to access ACM in each area, Asbestos abatement contractor shall dispose of all debris associated with demolition activities as ACM waste.

4. Removal and disposal of all ACM found within these areas such as exterior door lintel waterproofing flashing (black) & contaminated waterproofing paper (black), drain caulking (black), door caulking (black) and drain tar (black).

5. Provide all scaffolding, platform installation, equipment, tools, transportation and any other equipment required and/or necessary to complete all work described in the Contract Documents.

6. The asbestos abatement contractor shall be responsible for and shall include any and all fees or changes imposed by Local, State or Federal Law, Rule or Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the work.

7. Prior to destructive demolition activities, the DDC may elect to collect bulk samples of assumed asbestos-containing materials and analyze the bulk samples for asbestos content.

C. The asbestos abatement contractor shall perform the following work as described below and indicated on the drawings. The drawings are only a diagrammatic representation of the Work Areas and do not constitute the actual quantities of material. Asbestos abatement contractor is responsible for the confirmation of the actual total quantities of the Work.

1. Drawing H002.00: Second Floor and Roof Plan

a. Remove and dispose of asbestos-containing exterior door lintel waterproofing flashing (black) & contaminated waterproofing paper (black), door caulking (black), and drain caulking (black) within **Work Area 1.** Asbestos-containing drain caulking (black) shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-107 Foam Procedure for Roof Removal. Asbestos-containing exterior door lintel waterproofing flashing (black) & contaminated waterproofing paper (black), door caulking (black) shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-109 Abatement from Vertical Exterior Surfaces.

b. Remove and dispose of asbestos-containing drain tar (black) within **Work Area 2.** Asbestos-containing drain tar (black) shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-107 Foam Procedure for Roof Removal.

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
1	NYC DEP Section § 1-109 Abatement from Vertical Exterior Surfaces	6 Sq. Ft. of Exterior Door Lintel Waterproofing Flashing (Black) and Contaminated Waterproofing Paper (Black)	–
		2 Sq. Ft. of Door Caulking (Black)	–
	NYCDEP Section § 1-107 Foam Procedure for Roof Removal	1 Sq. Ft. of Drain Caulking (Black)	–
2	NYCDEP Section § 1-107 Foam Procedure for Roof Removal	1 Sq. Ft. of Drain Tar (Black)	–

D. The facility is under the jurisdiction of Queens Public Library. The asbestos abatement contractor shall perform the work of this contract in a manner that will be least disruptive to the normal use of the building.

E. Asbestos abatement contractor's attention is directed to the fact that patents cover certain methods of asbestos abatement indicated in the specifications. To date, patents have been issued with regard to negative pressure enclosures or negative or reduced pressure and glove-bag.

F. Asbestos abatement contractor shall be solely responsible for and shall hold the City of New York Department of Design and Construction and the City harmless from, any and all damages, losses and expenses resulting from any infringement by Asbestos abatement contractor of any patent, including but not limited to the patents described above, used by Asbestos abatement contractor during performance of this agreement.

G. Prior to starting, the asbestos abatement contractor must notify the Commissioner of the City of New York Department of Design and Construction if he anticipates any difficulty in performing the work as directed and required by these Specifications. Asbestos abatement contractor shall be required to attend an on-site job meeting with the Construction Project Manager prior to start of work to

examine conditions of the site for removal and plan the sequence for removal operations.

H. The asbestos abatement contractor shall retain a certified Project Designer for the preparation of an Asbestos Variance Application (ACP-9), if required.

I. The asbestos abatement contractor shall be responsible for preparing and submitting all filings, notifications, amendments and variances, etc. required by all City, State and Federal regulatory agencies having jurisdiction, at no additional cost to the NYC DDC.

J. The general contractor shall retain a Registered Design Professional (person licensed and registered to practice the professions of architecture or engineering under the Education Law of the State of New York) to prepare a Work Place Safety Plan (WPSP), if required.

K. The general contractor shall retain a Registered Design Professional (person licensed and registered to practice the professions of architecture or engineering under the Education Law of the State of New York) to perform final inspections required pursuant to Title 28 of the Administrative Code, including but not limited to special inspections required under Chapter 17 of the Building Code. Such special inspections and A-TR1 forms shall be completed by the Registered Design professional.

L. For coordination with other Asbestos abatement contractors, see the General Conditions governing all Contracts.

M. Related Asbestos Removal Work Under Other Contracts:

1. Each asbestos abatement contractor shall be responsible for the removal of incidental asbestos not identified in this section and found prior to or during the Work.

2. Incidental asbestos is defined as ACM that is discovered during the course of their work that must be abated to enable them to perform the work of their Contract.

N. Work Hours:

1. The asbestos abatement contractor shall establish his work schedule in a way that avoids interference or conflict with the normal functioning of the facility. Work in the evenings shall be done at no additional cost to the City.

2. All work shall be done during regular working hours unless the Asbestos abatement contractor requests authorization to work other than regular working hours and such authorization is granted by the Commissioner

(Regular working hours are those during which any given facility in which work is to be done is customarily open and functioning). If such work schedule is authorized by the Commissioner the work shall be done at no additional cost to the City.

3. The order of phases and start dates associated with each will be determined by the Construction Project Manager.

4. Asbestos abatement contractor shall be required to schedule waste transfer during evening hours, when activity within the facility is at a minimum. Evening hours are defined as 6:00 p.m. to 6:00 a.m. Waste transfer must be approved by the Construction Project Manager and Facility Manager.

O. The following conditions shall apply to all temporary shutdowns of existing services:

1. All temporary lighting and temporary electrical services for use in the Work Area shall be in weatherproof enclosures and be ground fault protected and:

a. Shall be performed at no additional charge to the City.

2. Shall be performed at times not interfering with the other activities in the building.

3. Shall be performed only with written consent from the Commissioner and the Facility Manager.

4. Shall be made through written request to the Commissioner at least 10 days in advance with complete written description of the work to be performed.

P. Stages of Asbestos Removal Work:

1. The asbestos abatement contractor will be required to perform the work and it is the intent of this Specification to remove all asbestos containing and asbestos contaminated materials from the Work Area. The asbestos abatement contractor is responsible for verifying all quantities of materials listed.

Q. Certain equipment in the Work Area may need to remain operational during removal. Therefore, the removal of ACM from this equipment shall be performed as the last removal activities within the Work Area. The Asbestos abatement contractor shall coordinate the scheduling for the removal of ACM on functioning equipment with the Construction Project Manager.

1.03 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

A. Requirements: The asbestos abatement contractor must be approved through the Department's Request for Subcontractor Approval, administered by the Agency Chief Contracting Office (ACCO), Vendor Integrity Unit. The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (6) below. Such documentation shall include without limitation, all required licenses, certificates, and documentation.

1. The asbestos abatement contractor must, whether an individual, corporation, partnership, joint venture or other legal entity, demonstrate for the three year period prior to the work that it has been licensed by the New York State Department of Labor (NYSDOL), as an "Asbestos Abatement Contractor". The asbestos abatement contractor shall submit copies of the asbestos abatement contractors NYSDOL License for the past three years

2. The asbestos abatement contractor must, for the three-year period prior to the work, have been in the business of providing asbestos abatement services as a routine part of its daily operations.

3. The asbestos abatement contractor proposing to do asbestos abatement work must be thoroughly experienced in such work and must submit a list of five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least $1,000,000 in each of the three years.

4. For each project submitted to meet the experience requirements set forth above, the asbestos abatement contractor must submit the following information for the project; name and location of the project; name title and telephone number and email address of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work; brief description of the scope of work completed as a prime or sub-asbestos abatement contractor; amount of contract or subcontract and the date of completion.

5. The asbestos abatement contractor must demonstrate that it has the financial resources, certified supervisory personnel and equipment necessary to carry out the work and to comply with the required performance schedule, taking into consideration other business commitments. The asbestos abatement contractor must submit such documentation as may be required by the Department of Design and Construction to demonstrate that it has the requisite capacity to perform the required services of this contract. The Department may also conduct an inspection of the asbestos abatement contractor's facility to verify if the contractor has equipment and staffing to perform the work.

6. The asbestos abatement contractor must submit a copy of their Corporate Health and Safety Plan for review and acceptance. A Job Hazard Analysis (JHA) for the specific work conducted must be included.

B. Throughout the specifications, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics thereof. Provide materials or workmanship that meet or exceed the specifically named codes or standards where required by these specifications.

C. Site Investigation: Asbestos abatement contractor shall inspect all the specifications and related drawings, and will investigate and confirm the site conditions affecting the work, including, but not limited to (1) through (5) below. The asbestos abatement contractor will attend a walkthrough site inspection with the department's Project Manager and the Third-Party Air Monitor prior to the work. Such walkthrough will be scheduled at the Department's convenience.

1. Physical considerations and conditions of both the material and structure. These considerations include any obstacles or obstructions encountered in accessing or removing the material.

2. Handling, storage, transportation and disposal of the material.

3. Availability of qualified and skilled labor.

4. Availability of utilities.

5. Exact quantities of all materials to be disturbed and/or removed.

1.04 WORK BY OTHERS

The City reserves the right during the term of this Contract to have work performed on asbestos abatement projects by other asbestos abatement contractors as the situation warrants.

1.05 DEFINITIONS

A. General Explanation: Certain terms used in this Specification Section are defined below. Definitions and explanations of this Specification Section are not necessarily complete or exclusive, but are general for the Work to the extent they are not stated more explicitly in another element of the Contract Documents.

B. Definitions in General Use:

1. Approve: Where used in conjunction with Engineer's response to submittals, requests, applications, inquiries, reports and claims by Asbestos abatement

contractor, the meaning of term "approved" will be held to limitations of Engineer's responsibilities and duties as specified in Contract Documents. In no case will "approval" by Engineer be interpreted as a release of Asbestos abatement contractor from responsibilities to fulfill requirements of Contract Documents.

2. Directed, Requested, etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by Engineer," "requested by Engineer," and similar phrases. However, no such implied meaning will be interpreted to extend Engineer's responsibility into Asbestos abatement contractor's responsibility for construction supervision.

3. Furnish: Except as otherwise defined in greater detail, term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

4. Indicated: The term "indicated" is a cross-reference to graphic representations, notes or schedules on Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.

5. Install: Except as otherwise defined in greater detail, term "install" is used to describe operations at Project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

6. Installer: The term "installer" is defined as the entity (person or firm) engaged by the asbestos abatement contractor, or its sub-asbestos abatement contractor for performance of a particular unit of work at Project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (installers) be expert in operations they are engaged to perform.

7. Provide: Except as otherwise defined in greater detail, term “provide” means furnish and install, complete and ready for intended use, as applicable in each instance.

8. Third-Party Air Monitor: The term “Third-Party Air Monitor” is defined as an entity engaged by City and Construction Project Manager to perform specific inspections or tests of the work, either at Project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

C. Definitions Relative to Asbestos Abatement:

1. Abatement: Any and all procedures physically taken to control fiber release from asbestos-containing materials. This includes removal, encapsulation, enclosure, cleanup and repair.

2. Adequately Wet: The complete penetration of a material with amended water to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material, then the material has not been adequately wetted. However, the absence of visible emissions is not evidence of being adequately wet. ACM must be fully penetrated with the wetting agent in order to be considered adequately wet. If the ACM being abated is resistant to amended water penetration, wetting agent shall be applied to the material prior to and during removal as necessary to minimize fiber release.

3. Aggressive Sampling: Method of sampling in which the individual collecting the air sample creates activity by the use of mechanical equipment during the sampling period to stir up settled dust and simulate activity in that area of the building.

4. AHERA: Asbestos Hazard Emergency Response Act of 1986

5. AIHA: American Industrial Hygiene Association.

6. Airlock: System for permitting entrance and exit while restricting air movement between a contaminated area and an uncontaminated area. It consists of two curtained doorways separated by a distance of at least three feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.

7. Air Sampling: Process of measuring the fiber content of a known volume of air collected during a specific period. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400, or the provisional transmission electron microscopy methods developed by the US EPA which is utilized for lower detection levels and specific fiber identification.

8. Ambient Air Monitoring: “Ambient air monitoring” shall mean measurement or determination of airborne asbestos fiber concentrations outside but in the general vicinity of the worksite.

9. Amended Water: Water to which a surfactant has been added.

10. ANSI: American National Standards Institute

11. Area Air Sampling: Any form of air sampling or monitoring where the sampling device is placed at some stationary location.

12. Asbestos: Any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.

13. Asbestos-Containing Material (ACM): Asbestos or any material containing more than one-percent asbestos.

14. Asbestos-Containing Waste Material: ACM, asbestos-contaminated objects or debris associated with asbestos abatement requiring disposal.

15. Asbestos-Contaminated Objects: Any objects which have been contaminated by asbestos or asbestos-containing material.

16. Asbestos Assessment Report: "Asbestos Assessment Report" shall mean the "Form ACP-5" form, as approved by NYCDEP, by which a NYCDEP-certified asbestos investigator certifies that a building or structure (or portion thereof) is free of ACM or the amount of ACM to be abated constitutes a minor project.

17. Asbestos Handler: Individual who disturbs, removes, repairs, or encloses asbestos material. This individual shall have completed approved training course(s) and be in possession of certification issued by NYCDEP and NYSDOL.

18. Asbestos Handler Supervisor: Individual who supervises the handlers during an asbestos project and ensures that proper asbestos abatement procedures as well as individual safety procedures are being adhered to. This individual shall have completed approved training course(s) and be in possession of certification issued by NYCDEP and NYSDOL.

19. Asbestos Investigator: An individual certified by NYCDEP as having successfully demonstrated his or her ability to identify the presence of and evaluate the condition of asbestos in a building or structure.

20. Asbestos Project: Any form of work performed in a building or structure which will disturb (e.g., remove, enclose, encapsulate) asbestos-containing material.

21. ASTM: American Society for Testing and Materials.

22. Asbestos Project Notification: The "Form ACP-7" asbestos project notification form as approved by DEP.

23. Authorized Visitor: Authorized visitor shall mean the building owner and his/her representative, and any representative of a regulatory or other agency having jurisdiction over the project.

24. Building Owner: Person in whom legal title to the premises is vested unless the premises are held in land trust, in which instance Building Owner means the person in whom beneficial title is vested.

25. Building Materials: Any and all manmade materials, including but not limited to interior and exterior finishes, equipment, bricks, mortar, concrete, plaster, roofing, flooring, caulking, sealants, tiles, insulation, and outdoor paving such as sidewalks, paving tiles and asphalt.

26. Certified Industrial Hygienist (CIH): Individual with a minimum of five years experience as an industrial hygienist and who has successfully completed both levels of the examination administered by the American Board of Industrial Hygiene and who is currently certified by that board.

27. Certified Safety Professional (CSP): Individual having a bachelor's degree from an accredited college or university and a minimum of four years experience as a safety professional and who has successfully completed both levels of the examination administered by the Board of Certified Safety Professionals and who is currently certified by that board.

28. Chain of Custody: "Chain of Custody" shall mean the form or set of forms that document the collection and transfer of a sample.

29. City: City of New York

30. Clean Room: An uncontaminated area or room that is part of worker decontamination enclosure system with provisions for storage of workers' street clothes and protective equipment.

31. Clearance Air Monitoring: Employment of aggressive sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers and shall be performed as the final abatement activity.

32. Commissioner: shall mean the head of the Agency that has entered into this contract or his/her duly authorized representative.

33. Competent Person: Shall mean the designated person as defined by OSHA in 29 CFR1926.1101.

34. Curtained Doorway: Device that consists of at least three overlapping sheets of fire retardant plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side, and the third sheet at the top and left side. All sheets shall have weights attached to the bottom to ensure that the sheets hang straight and maintain a seal over the doorway when not in use.

35. Decontamination Enclosure System: Series of connected rooms, separated from the Work Area and from each other by air locks, for the decontamination of workers, materials, waste containers, and equipment.

36. Demolition: The dismantling or razing of a building, including all operations incidental thereto (except for asbestos abatement activities), for which a demolition permit from the New York City Department of Buildings is required.

37. Department: shall mean the New York City Department of Design and Construction (DDC).

38. NYCDEP or DEP: The New York City Department of Environmental Protection.

39. Disturb: Any action taken which may alter, change, or stir, such as but not limited to the removal, encapsulation, enclosure or repair of asbestos-containing material.

40. DOB: The New York City Department of Buildings.

41. Egress: A continuous and unobstructed path of vertical and horizontal egress travel from any occupied portion of a building or structure to a public way. A means of egress consists of three separate and distinct parts: the exit access, the exit and the exit discharge.

42. ELAP: Environmental Laboratory Approval Program administered by the New York State Department of Health.

43. Encapsulant (sealant) or Encapsulating Agent: Liquid material which can be applied to ACM and which temporarily controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.

44. Encapsulation: The coating or spraying of asbestos-containing material encapsulant. A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.

45. Enclosure: Construction of airtight walls and/or ceilings between ACM and the facility environment, or around surfaces coated with ACM, or any other appropriate procedure as determined by the NYCDEP which prevents the release of asbestos fibers.

46. EPA or USEPA: United States Environmental Protection Agency.

47. Equipment Room: Contaminated area or room that is part of the worker decontamination enclosure system with provisions for the storage of contaminated clothing and equipment.

48. Exit: That portion of a means of egress system which is separated from other interior spaces of a building or structure by fire-resistance-rated construction to provide a protected path of egress travel between the exit access and the exit discharge.

49. FDNY: The Fire Department of the City of New York.

50. Fiber: An acicular single crystal or a similarity elongated polycrystalline aggregate which displays some resemblance to organic fibers by having such properties as flexibility, high aspect ratio, silky luster, axial lineation, and others, and which has attained its shape primarily through growth rather than cleavage.

51. Fixed Object: A unit of equipment, furniture, or other item in the work area which cannot be removed from the work area. Fixed objects shall include equipment, furniture, or other items that are attached, in whole or in part, to a floor, ceiling, wall, or other building structure or system or to another fixed object and cannot be reasonably removed from the work area. Fixed objects shall also include pipes and other equipment inside the work area which are not the subject of the asbestos project. Active fire suppression system components shall not be considered fixed objects.

52. Glovebag technique: shall mean a method for removing asbestos-containing material from heating, ventilation and air conditioning (HVAC) ducts, short piping runs, valves, joints, elbows, and other nonplanar surfaces. The glovebag assembly is a manufactured device consisting of a large bag (constructed of at least 6-mil transparent plastic), two inward-projecting long sleeve gloves, one inward-projecting waterwand sleeve, an internal tool

pouch, and an attached, labeled receptacle for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and contains all asbestos fibers released during the removal process.

53. HEPA-Filter: High efficiency particulate air filter capable of trapping and retaining 99.97 percent of particles (asbestos fibers) greater than 0.3 micrometers mass median aerodynamic equivalent diameter.

54. HEPA vacuum equipment: "HEPA vacuum equipment" shall mean vacuuming equipment with a HEPA filter.

55. Holding Area: Chamber in the equipment decontamination enclosure located between the washroom and an uncontaminated area.

56. Homogeneous Work Area: Portion of the Work Area that contains one type of ACM and/or where one type of abatement is used.

57. Industrial Hygiene: Science and art devoted to the recognition, evaluation, and control of those environmental factors or stresses, arising in or from the work place, which may cause sickness, impaired health and well being, or significant discomfort and inefficiency among worker or among the citizens of the community.

58. Industrial Hygienist: Individual having a college or university degree or degrees in Engineering, Chemistry, Physics or Medicine, or related Biological Sciences who, by virtue of special studies and training, has acquired competence in industrial hygiene. Such special studies and training must have been sufficient in all of the above cognate sciences to provide the abilities:

    a. To recognize the environmental factors and to understand their effect on people and their well being; and

    b. To evaluate, on the basis of experience and with the aid of quantitative measurement techniques, the magnitude of these stresses in terms of ability to impair people's health and well being; and

    c. To prescribe methods to eliminate, control, or reduce such stresses when necessary to alleviate their efforts.

59. Isolation Barrier: The construction of partitions, the placement of solid materials, and the plasticizing of apertures to seal off the work place from surrounding areas and to contain asbestos fibers in the work area.

60. Large Asbestos Project: Asbestos project involving the disturbances (e.g., removal, enclosure, encapsulation) of 260 linear feet or more of ACM or 160 square feet or more of ACM.

61. Log: An official record of all activities that occurred during the project. At a minimum, the log shall identify the building owner, agent, asbestos abatement contractor, and workers, and other pertinent information including daily activities, cleanings and waste transfers, names and certificate numbers of asbestos handler supervisors and asbestos handlers; results of inspections of decontamination systems, barriers, and negative pressure ventilation equipment; summary of corrective actions and repairs; work stoppages with reason for stoppage; manometer readings at least twice per work shift; daily checks of emergency and fire exits and any unusual events.

62. Minor Project: A project involving the disturbance (e.g., removal, enclosure, encapsulation, repair) of 25 linear feet or less of asbestos containing material or 10 square feet or less of asbestos containing material.

63. Movable Object: Unit of equipment or furniture in the Work Area that can be removed from the Work Area.

64. Negative Air Pressure Equipment: Portable local exhaust system equipped with HEPA filtration. The system shall be capable of creating a negative pressure differential between the outside and inside of the Work Area.

65. NESHAPS: National Emission Standards for Hazardous Air Pollutants.

66. NFPA: The National Fire Protection Association.

67. NIOSH: National Institute for Occupational Safety and Health.

68. DEP or NYCDEP: New York City Department of Environmental Protection

69. NYSDOL: New York State Department of Labor.

70. NYSDOL ICR 56: “NYSDOL ICR 56” shall mean Part 56 of the Official Compilation of Codes, Rules and Regulations of the State of New York or 12 NYCRR Part 56.

71. NYSDOH: The New York State Department of Health.

72. Obstruction: The blocking of a means of egress with any temporary structure or barrier. A double layer of fire-retardant 6-mil polyethylene sheeting shall not be considered an obstruction when it is prominently marked as an exit with photo luminescent signage or paint and cutting tools

(knife, razor) are attached to the work area side of the sheeting for use in the event that the sheeting must be cut to permit egress. A corridor shall not be considered obstructed when there is a clear path measuring at least three (3) feet wide.

73. Occupied Area: Area of the work site where abatement is not taking place and where personnel or occupants normally function or where workers are not required to use personal protective equipment.

74. OSHA: Occupational Safety and Health Administration.

75. Outside air: “Outside air” shall mean the air outside the work place.

76. Person: Individual, partnership, company, corporation, association, firm, organization, governmental agency, administration, or department, or any other group of individuals, or any officer or employee thereof.

77. Personal Air Monitoring: Method used to determine employees' exposure to airborne asbestos fibers. The sample is collected outside the respirator in the worker's breathing zone.

78. Personal Protective Equipment (PPE): Appropriate protective clothing, gloves, eye protection, footwear, and head gear.

79. Phase Contrast Microscopy (PCM): The measurement protocol for the assessment of the fiber content of air. (NIOSH Method 7400).

80. Physician: Person licensed or otherwise authorized under Article 131 Section 65.22 of the New York State Education Law.

81. Plasticize: To cover floors and walls with fire retardant plastic sheeting as herein specified or by using spray plastics as acceptable to the Department.

82. Polarized Light Microscopy (PLM): The measurement protocol for the assessment of the asbestos content of bulk materials. (Interim Method for the Determination of Asbestiform Materials in Bulk Insulation Samples- 40 CFR Part 763, Subpart F, Appendix A as amended on September 1, 1982)

83. Project Designer: A person who holds a valid Project Designer Certificate issued by the New York State Department of Labor.

84. Project Monitor: A person who holds a valid Project Monitor Certificate issued by the New York State Department of Labor.

85. Qualitative Fit Test: Individual test subject's responding (either voluntarily or involuntarily) to a chemical challenge outside the respirator face-piece. Acceptable methods include irritant smoke test, odorous vapor test, and taste test.

86. Quantitative Fit Test: Exposing the respiratory wearer to a test atmosphere containing an easily detectable, nontoxic aerosol, vapor or gas as the test agent. Instrumentation, which samples the test atmosphere and the air inside the face-piece of the respirator, is used to measure quantitatively the leakage into the respirator. There are a number of test atmospheres, test agents, and exercises to perform during the test.

87. Registered Design Professional: A person licensed and registered to practice the professions of architecture or engineering under the Education Law of the State of New York.

88. Removal: Stripping of any asbestos- containing materials from surfaces or components of a facility or taking out structural components in accordance with 40 CFR 61 Subparts A and M.

89. Renovation: An addition or alteration or change or modification of a building or the service equipment thereof, that is not classified as an ordinary repair as defined in §27-125 of the Administrative Code of the City of New York.

90. Repair: Corrective action using specified work practices (e.g., glovebag, plastic tent procedures, etc.) to minimize the likelihood of fiber release from minimally damaged areas of ACM.

91. Replacement material: Any material used to replace ACM that contains less than .01 percent asbestos.

92. Shift: A worker’s, or simultaneous group of workers’, complete daily term of work.

93. Shower Room: Room between the clean room and the equipment room in the worker decontamination enclosure with hot and cold running water controllable at the tap and arranged for complete showering during decontamination.

94. Small Asbestos Project: Asbestos project involving the disturbance (e.g., removal, enclosure, encapsulation) of more than 25 and less than 260 linear feet of ACM or more than ten and less than 160 square feet of ACM.

95. Staging Area: Work Area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the Work Area.

96. Strip: To remove asbestos materials from any part of the facility.

97. Structural Member: Load-supporting member of a facility, such as beams and load-supporting walls, or any non-load-supporting member, such as ceiling and non-load-supporting walls.

98. Surface barriers: The plasticizing of walls, floors, and fixed objects within the work area to prevent contamination from subsequent work.

99. Surfactant: Chemical wetting agent added to water to improve penetration.

100. Transmission Electron Microscopy (TEM): The measurement protocol for the assessment of the asbestos fiber content of air. Interim Transmission Electron Microscopy Analytical Methods-40 CFR Part 763, Subpart E, Appendix A.

101. Visible Emissions: Emissions containing particulate material that are visually detectable without the aid of instruments.

102. Washroom: Room between the Work Area and the holding area in the equipment decontamination enclosure system where equipment and waste containers are wet cleaned and/or HEPA-vacuumed prior to disposal.

103. Waste decontamination enclosure system: “Waste decontamination enclosure system” shall mean the decontamination enclosure system designated for the controlled transfer of materials and equipment, consisting of a washroom and a holding area.

104. Wet Cleaning: “Wet cleaning” shall mean the removal of asbestos fibers from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water.

105. Wet methods: “Wet methods” shall mean the use of amended water or removal encapsulants to minimize the generation of fibers during ACM disturbance.

106. Work Area: Designated rooms, spaces, or areas of the building or structure where asbestos abatement activities take(s) place.

107. Worker Decontamination Enclosure System: Portion of a decontamination enclosure system designed for controlled passage of workers and authorized visitors, consisting of a clean room, a shower room, and an equipment room separated from each other and from the Work Area by airlocks and curtained doorways.

108. Work Place: The work area and the decontamination enclosure system(s).

109. Work Place Safety Plan: Construction documents prepared by a registered design professional and submitted for review by DEP in order to obtain an asbestos abatement permit. Such plan shall include, but not be limited to, plans, sections, and details of the work area clearly showing the extent, sequence, and means and methods by which the work is to be performed.

110. Work Site: Premises where abatement activity is being performed. May be composed of one or more Work Areas.

1.06 STANDARD OPERATING PROCEDURES

A. Develop and implement a written standard procedure for abatement work to ensure maximum protection and safeguard from asbestos exposure of the workers, visitors, employees, public, and environment.

B. TELEPHONE DEVICE

The asbestos abatement contractor or his authorized representative shall, at all times during the normal workday or during periods of overtime work under this Contract, carry a mobile cellular telephone capable of transmitting photographs and data. He/she shall supply the Department of Design and Construction with the phone number for the device and he/she is liable to respond back to the calls from DDC within the next one (1) hour period after he/she receives calls from DDC. The cost to the asbestos abatement contractor for this device and all charges accruing thereto is deemed included in the work.

C. The standard operating procedure shall ensure:

1. Tight security from unauthorized entry into the workspace.

2. Restriction of asbestos abatement contractor's personnel to the immediate Work Area and access/egress routes.

3. Donning of proper protective clothing and respiratory protection prior to entering the Work Area.

4. Safe work practices in the work place, including provisions for inter-room communications, exclusion of eating, drinking, smoking, or in any way breaking the respiratory protection.

5. Proper exit practices from the work space to the outside through the showering and decontamination facilities.

6. Removing asbestos in a way that minimizes release of fibers.

7. Packing, labeling, loading, transporting, and disposing of contaminated material in a way that minimizes exposure and contamination.

8. Emergency evacuation procedures, for medical or safety situations, to minimize the potential exposure to airborne asbestos fibers for emergency personnel, building occupants, and building environment.

9. Safety from accidents in the workspace, especially from electrical shocks, fall hazards associated with scaffolding, slippery surfaces, and entanglements in loose hoses and equipment.

10. Provisions for effective supervision, air monitoring and personnel monitoring for exposure during the work.

11. Engineering controls that minimize exposure to fibers within the workspace.

12. The asbestos abatement contractor shall provide a 24-hour fire watch throughout the entire term of the project, to protect against fire and unauthorized entry into the workspace when required by the NYCDEP. Fire watch shall be performed by an individual who is a certified asbestos worker capable of entering the Work Area for regular inspections.

D. Provide an Asbestos Handler Supervisor to provide continuous supervision of all work, and to be responsible for the following:

1. Ensure that individuals are using proper personal protective equipment, are trained in its use and hold valid NYCDEP and NYSDOL Asbestos Handler certificates.

2. Maintain entry log records and ensure that they are recorded in accordance with the provisions of Title 15, Chapter 1 of RCNY and NYSDOL ICR 56.

3. Surveillance of the Work Areas at a minimum of once per work shift or as required by Title 15, Chapter 1 of RCNY and NYSDOL ICR 56 -7.3, to ensure the integrity of work place isolation, negative pressure equipment and workers personal protective equipment is not torn or ripped and that respiratory protection is worn at all times.

4. Ensure that sufficient personal protective equipment is stored in the clean room.

5. Take precautions to prevent heat stress. Precautions include, but are not limited to, selecting lightweight protective clothing, reducing the work rate, and providing adequate fluid breaks.

6. Perform work area inspection with project monitor prior to the commencement of final clearance air monitoring.

7. The asbestos abatement contractor shall retain the asbestos handler supervisor to perform a visual inspection prior to the post-abatement clearance air monitoring to confirm that all containerized waste has been removed from work and holding areas and there is no visible ACM debris or residue on or about all abated surfaces.

E. ENGINEERING CONTROLS

1. All asbestos projects shall utilize negative pressure ventilation equipment.

   a. The asbestos abatement contractor shall use a manometer to document the pressure differential. The asbestos abatement contractor shall install and make the manometer operational once the negative pressure has been established in the work area. Magnahelic manometers shall be calibrated at least every six months and a copy of the current calibration certification shall be available at the work site.

2. Negative pressure ventilation equipment shall be installed and operated to provide at least one air change in the work area every 15 minutes. Where there are no floor or wall barriers because floor or wall material is being abated, there shall be at least one air change in the work area every ten minutes.

3. The negative pressure ventilation equipment shall operate continuously, 24 hours a day, from the establishment of isolation barriers through successful clearance air monitoring. If such equipment shuts off, adjacent areas shall be monitored for asbestos fibers.

4. A static negative air pressure of 0.02 inches (minimum) water column shall be maintained at all times in the work place during abatement to ensure that contaminated air in the Work Area does not filter back to uncontaminated areas.

5. If the contaminated area of an asbestos project covers the entire floor of the affected building, or an area greater than 15,000 square feet on any given floor, the installation of a negative air cut off switch or switches shall be required at a single location outside the work place, such as inside a stairwell, or at a secured location in the ground floor lobby when conditions warrant. The required switch or switches shall be installed by a licensed electrician pursuant to a permit issued by the Department of Buildings. If negative pressure ventilation equipment is used on multiple floors, the cut off switch shall be able to turn off the equipment on all floors.

6. On loss of negative pressure or electric power to the negative pressure ventilating units, abatement shall stop immediately and shall not resume until power is restored and negative pressure ventilation equipment is operating again.

7. Negative pressure ventilation equipment shall be exhausted to the outside of the building away from occupied areas.

    a. All openings (including but not limited to operable windows, doors, vents, air intakes or exhausts of any mechanical devices) less than 15 feet from the exterior exhaust duct termination location shall be plasticized with two layers of fire retardant 6-mil polyethylene sheeting, or a second negative pressure ventilation unit with the primary unit's capacity shall be connected in series prior to exhausting to the outside.

    b. Negative pressure ventilation equipment shall exhaust away from areas accessible to the public.

    c. All ducting shall be sealed and braced or supported to maintain airtight joints. Ducts shall be reinforced and shall be installed so as to prevent breakage. Damage to ducts must be repaired immediately.

8. Where ducting to the outside is not possible, a second negative pressure ventilation unit compatible with the primary unit's capacity shall be connected in series. The area receiving the exhaust shall have sufficient, non-recycling exhaust capacity to the outside of the structure.

9. In the event that there is a failure of the containment system or a breach in the Isolation Barriers, all abatement work will cease and the asbestos abatement contractor will immediately correct the condition. Abatement work will not resume until the Work Area has been smoke tested by the third party laboratory and approved by the Construction Project Manager.

F. LOCKDOWN ENCAPSULATION PROCEDURES

1. The following procedures shall be followed to seal in non-visible residue while conducting lockdown encapsulation on all surfaces from which ACM has not been removed:

a. Only encapsulants rated as acceptable or marginally acceptable on the basis of Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 USEPA Contract shall be used for lockdown encapsulation.

b. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon unless reviewed and approved by DEP.

c. Latex paint with solids content greater than 15 percent shall be considered a lockdown sealant for coating all non-metallic surfaces.

d. Encapsulants shall be applied using airless spray equipment. Spraying is to occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.

e. The cleaned layer of the surface barriers shall be removed from walls and floors.

The isolation barriers shall remain in place throughout cleanup. Decontamination enclosure systems shall remain in place and be utilized. A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.

1.07 NOTIFICATIONS, PERMITS, WARNING SIGNS, LABELS, AND POSTERS

A. The asbestos abatement contractor shall submit an Asbestos Project Notification (ACP-7) to the NYCDEP listing each work area within the building separately one week in advance of the start of work.

B. The registered design professional shall obtain an asbestos abatement permit authorizing the performance of construction work as required for asbestos projects involving one or more of the following activities:

1. Obstruction of an exit door leading to an exit stair or the exterior of the building;

2. Obstruction of an exterior fire escape or access to that fire escape;

3. Obstruction of a fire-rated corridor leading to an exit door;

4. Removal of handrails in an exit stair or ramp;

5. Removal or dismantling of any fire alarm system component including any fire alarm-initiating device (e.g., smoke detectors, manual pull station);

6. Removal or dismantling of any exit sign or any component of the exit lighting system, including photo luminescent exit path markings;

7. Removal or dismantling of any part of a sprinkler system including piping or sprinkler heads;

8. Removal or dismantling of any part of a standpipe system including fire pumps or valves;

9. Removal of any non-load bearing / non-fire-rated wall (greater than 45 square feet or 50 percent of a given wall);

10. Any plumbing work other than the repair or replacement of plumbing fixtures;

11. Removal of any fire-resistance rated portions of a wall, ceiling, floor, door, corridor, partition, or structural element enclosure including spray-on fire resistance rated materials;

12. Removal of any fire damper, smoke damper, fire stopping material, fire blocking, or draft stopping within fire-resistance rated assemblies or within concealed spaces;

13. Any work that otherwise requires a permit from the DOB (full demolitions, alterations, renovations, modifications or plumbing work).

C. The asbestos abatement contractor shall provide a floor plan showing the areas of the building under abatement and the location of all fire exits in said areas. It shall be prominently posted in the building lobby or comparable location, along with a notice stating the location within the building of the negative air cutoff switch, if applicable.

D. When one or more of the activities listed in 1.07 (B) (1-8) and (B)(13) of this specification an asbestos abatement permit is required by DEP. The general contractor is responsible for submitting, a work place safety plan (WPSP) and any other applicable construction documents. These documents must be prepared and sealed by a registered design professional.

E. A WPSP is not required for projects requiring an asbestos abatement permit due to one or more of the activities listed in 1.07 (B) (9-12) of this specification. The asbestos abatement contractor shall submit, together with the asbestos project notification, all applicable asbestos abatement permit construction documents.

F. The general contractor shall retain a Registered Design Professional to perform the inspections required pursuant to Title 28 of the Administrative Code, including but not limited to special inspections required by Chapter 17 of the Building Code, as follows:

1. A final inspection shall be performed by a registered design professional retained by the general contractor after all work authorized by the asbestos abatement permit is completed. The person performing the inspection shall note all failures to comply with the provisions of the Building Code or approved asbestos abatement permit and shall promptly notify the owner in writing. All defects noted in such inspection shall be corrected. The final inspection report shall either:

a. Confirm:

(1) That the construction work is complete, including the reinstallation or reactivation of any building fire safety or life safety component.

(2) That any defects previously noted have been corrected.

(3) That all required inspections were performed.

(4) That the work is in substantial compliance with the approved asbestos abatement permit construction documents, the Building Code, and other applicable laws and rules.

b. Confirm:

(1) That the construction work does not return the building (or portion thereof) affected by the abatement project to a condition compliant with the building code and other applicable laws and rules, but that the registered design professional has reviewed an application for asbestos abatement permit construction documents approval that has been approved by the department of buildings, and the subsequent scope of work as approved will, upon completion, render all areas affected by the asbestos project in full compliance with the building code and all applicable laws and rules.

(2) That any defects previously noted that are not addressed by the subsequent scope of work as approved by the department of buildings, have been corrected.

(3) That all required inspections that are not addressed by the subsequent scope of work as approved by the department of buildings were performed.

(4) That all completed work pursuant to an asbestos abatement permit is in substantial compliance with the approved asbestos abatement permit construction documents.

G. The Registered Design Professional shall provide the final inspection reports to be filed with DEP on A-TR1 form. Records of final inspections made by registered design professionals shall be submitted to DDC as part of the close out document package.

H. Erect bilingual (English-Spanish) warning signs around the work space and at every point of potential entry from the outside and at main entrance to building which can be viewed by the public without obstruction, in accordance with OSHA 29 CFR 1926.1101 (K) (Sign Specifications) and Title 15, Chapter 1 of RCNY. The warning signs shall be a bright color so that they will be easily noticeable. The size of the sign and the size of the lettering shall be no less than OSHA requirements.

I. Provide the required labels for all polyethylene bags and all drums utilized to transport contaminated material to the landfill in accordance with OSHA 29 CFR 1926.1101 (K)(2) and by 49 CFR Parts 171 and 172 of the Department of Transportation regulations.

J. Provide any other signs, labels, warnings, and posted instructions that are necessary to protect, inform and warn people of the hazard from asbestos exposure. Post in a prominent and convenient place for the workers a copy of the latest applicable regulations from OSHA, EPA, NIOSH, State of New York and New York City and any additional items mandated for posting by the aforementioned regulations.

K. Furnish all permits, variances and notices required to perform the Work.

1.08 EMERGENCY PRECAUTIONS

A. Establish emergency and fire exits from the Work Area. The clean side of all emergency exits shall be equipped with two full sets of protective clothing and respirators at all times.

B. Notify local medical emergency personnel, both ambulance crews and hospital emergency room staff prior to commencement of abatement operations as to the possibility of having to handle contaminated or injured workmen.

C. Prepare to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated immediately for decontamination. When an injury occurs, precautions shall be taken to reduce airborne fiber concentrations (i.e., misting of the air with water) until the injured person has been removed from the Work Area.

D. Notify, before actual removal of the asbestos material, the local police and fire departments to the danger of entering the Work Area. Asbestos abatement contractor shall make every effort to help these agencies form plans of action should their personnel need to enter the contaminated area.

1.09 SUBMITTALS

A. Pre-Construction Submittals:

1. Attend a pre-construction meeting scheduled by the Department. This meeting shall also be attended by a designated representative of the City of New York third party air monitoring firm, facility manager and the Construction Project Manager. At this meeting, the asbestos abatement contractor shall present three copies of the following items, bound and indexed. The detailed plan of action must be submitted at least five (5) days prior to the pre-construction meeting.

   a. Asbestos abatement contractor’s scope of work, work plan and schedule.

   b. Asbestos project notifications, approved variances and plans to Government Agencies.

   c. Copies of Permits, clearance and licenses if required.

   d. Schedules: the asbestos abatement contractor shall provide to the Construction Project Manager a copy of the following schedules for approval. Once approved, schedules shall be maintained and updated as received. Asbestos abatement contractor shall post a copy of all schedules at the site:

      (1) A construction schedule stating critical dates of the project including, but not limited to, mobilization, Work Area preparation, demolition, gross removal, fine cleaning, encapsulation, inspections, clearance monitoring, and phase of

refinishing and final inspections. The schedule shall be updated biweekly, at a minimum.

(2) A schedule of staffing stating number of workers per shift per activity, name and number of supervisor(s) per shift, shifts per day, and total days to be worked.

(3) Submit all changes in schedule or staffing to the Construction Project Manager prior to implementation.

(4) A schedule of equipment to be used including numbers and types of all major equipment such as HEPA Air Filtration Units, HEPA-vacuums, airless sprayers, Water Atomizing Devices and Type "C" compressors.

e. A written plan and shop drawings for preparation of work site and decontamination chamber.

f. Description of protective clothing and approved respirator to be used, make, model, NIOSH approval numbers.

g. Delineation of responsibility of work site supervision, including competent person, with names, resumes, and home telephone numbers.

h. Explanation of decontamination sequence and isolation techniques.

i. Description of specific equipment to be utilized, including make and model number of air filtration devices, vacuums, sprayers, etc.

j. Description of any prepared methods, procedures, techniques, or equipment other than those specified in the Contract Documents.

k. Explanation of the handling of asbestos contaminated wastes including EPA and NYCDEC identification numbers of Waste Hauler.

l. Description of the final clean-up procedures to be used.

m. Name and qualifications of asbestos abatement contractor's Air Monitor including AIHA accreditation, and proof of NIOSH PAT and NIST/NVLAP Bulk Quality Assurance Proficiency of OSHA samples for approval by the City of New York Department of Design and Construction.

n. Written description of emergency procedures to be followed in case of injury or fire. This section must include evacuation procedures, source of medical assistance (name and telephone number) and procedures to be used for access by medical personnel (examples: first aid squad and physician). NOTE: Necessary Emergency Procedures Shall Take Priority Over All Other Requirements of These Specifications.

o. Safety Data Sheets (SDS) for encapsulants, sealants, firestopping foam, cleaners/disinfectants, spray adhesive and any and all potentially hazardous materials that may be employed on the project. No work involving the aforementioned will be allowed to proceed until SDS are reviewed.

p. Worker Training and Medical Surveillance: Asbestos abatement contractor shall submit a list of the NYSDOL and NYCDEP Asbestos supervisors and handlers who will work on this project. Present evidence that workers have received proper training required by the regulations and required by OSHA 29 CFR 1926.1101 (Asbestos Standard) and 1926.1200 (HAZCOM standard) and any other standards applicable to the work.

q. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.

(1) The asbestos abatement contractor shall provide a permanently bound log book of minimum 8-1/2” x 11” size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book shall contain all information specified in ICR56-3.4 (a)(2)(i).

(2) All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted. Any significant events occurring during the abatement project shall be entered into the log. Upon completion of the job, the Asbestos abatement contractor shall submit a copy of the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.

(3) Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of ACM, understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.

B. During Construction Submittals:
Submit copies of the following items to the Construction Project Manager during the work:

1. Security and safety logs showing names of person entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.

2. Progress logs showing the number of workers, supervisors, hours of work and tasks completed shall be submitted daily to the Construction Project Manager.

3. Floor plans indicating asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager at weekly progress meetings.

4. All asbestos abatement contractors' air monitoring and inspection results.

C. Project Closeout Submittals:

Upon completion of the project and as a condition of acceptance, the asbestos abatement contractor shall present two copies of the following items, bound and indexed:

1. Lien Waivers from asbestos abatement contractor, Sub-asbestos abatement contractors and Suppliers,

2. Daily OSHA air monitoring results,

3. All Waste Manifests (Asbestos and Construction Debris), seals and disposal logs,

4. Field Sign-In/Sign-Out Logs for every shift,

5. Copies of all Building Department Forms and Permits,

6. A Letter of Compliance stating that all the work on this project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations,

7. All Warranties as stated in the Specifications,

    a. Fully executed disposal certificates and transportation manifest.

8. Project Record: The asbestos abatement contractor shall maintain a project record for all small and large asbestos projects. During the project, the project record shall be kept on site at all times. Upon completion of the project, the project record shall be maintained by the building owner. The project record shall consist of:

    a. Copies of licenses of all asbestos abatement contractors involved in the project;

    b. Copies of DEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;

    c. Copies of all project notifications and reports filed with DEP, NYSDOL and EPA for the project, with any amendments or variances;

    d. Copies of all asbestos abatement permits, including associated approved plans and work place safety plan;

    e. A copy of the air sampling log and all air sampling results;

    f. A copy of the abatement asbestos abatement contractor's daily log book;

    g. All data related to bulk sampling including the results of any asbestos surveys performed by an asbestos investigator;

    h. Copies of all asbestos waste manifests;

    i. A copy of all Project Monitor's Reports (ACP-15).

    j. A copy of each ATR-1 Form completed for the asbestos project (if required).

    k. A copy of each Asbestos Project Conditional Closeout Report (ACP-20).

    l. A copy of the Asbestos Project Completion Form (ACP-21).

    m. A copy of the project record shall be submitted to DDC and its Third Party Air Monitor within 48 hours of the Issuance of the ACP-21 form, as part of the close out documents.

9. The asbestos abatement contractor shall submit one of the following certifications to the general contractor, with a copy provided to DDC:

a. Asbestos Project Completion Form. If an asbestos project has been performed, a copy of the asbestos project completion form issued by DEP shall be submitted to DOB, with a copy being provided to DDC, prior to the issuance of a DOB permit and to any amendment of the underlying construction document approval which increases the scope of the project to include (a) work area(s) not previously covered.

b. An Asbestos Project Conditional Close-out Form. If an asbestos project has been performed a copy of the asbestos project conditional close-out form issued by DEP shall be submitted to DOB, with a copy being provided to DDC, prior to the issuance of a DOB permit and to any amendment of the underlying construction document approval which increases the scope of the project to include (a) work area(s) not previously covered.

1.10 QUALITY ASSURANCE

A. All work required for the completion of this project or called for in this Specification must be executed in a workmanlike manner by using the appropriate methods established by regulatory requirements and/or industrial standards. All workmanship or work methods are subject to review and acceptance by the Construction Project Manager. Throughout the Specification, reference is made to codes and standards which establish qualities, levels or types of workmanship which will be considered acceptable. It is the asbestos abatement contractor's responsibility to comply with these codes and standards during the execution of this work.

B. All materials and equipment required or consumed during the work of this Contract must meet the minimum acceptable criteria established by codes and standards referenced elsewhere in this Specification. Materials and equipment must be submitted for prior approval to the DDC project manager as part of the asbestos abatement contractor's "Shop Drawings".

C. It is the asbestos abatement contractor's responsibility, when so required by the Specification or upon written request from the Commissioner or his representative to furnish all required proof that workmanship, materials and/or equipment meet or exceed the codes and standards referenced. Such proof shall be in the form requested, typically a certified report or test conducted by a testing entity approved for that purpose by DDC.

D. The asbestos abatement contractor shall furnish proof that employees working under his supervision have had instruction on the dangers of asbestos exposure, on respirator use, decontamination, and OSHA regulations. This proof shall be in the form of a notarized affidavit to the effect that the above requirements have been

satisfied and a copy of the Job Hazard Analysis (JHA) with tool box meeting executed meeting sign in sheet.

E. The asbestos abatement contractor will have posted and in view at the job site the OSHA regulations 29 CFR 1910.1001, and 1926.1101 Asbestos Standard, and 29 CFR 1926.59 Hazard Communication Standard Environmental Protection Agency 40 CFR, Part 61, subpart B: National Emission Standard for asbestos, asbestos stripping, work practices and disposal of asbestos waste. One copy of NYC Title 15, Chapter 1 of RCNY and NYS DOL ICR 56 at the job site at all times.

F. Familiarity with Pertinent Codes and Standards: In procuring all items used in this work, it is the asbestos abatement contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this work meet or exceed the specified requirements, and are suitable for their intended use.

G. Rejection of Non-Complying Items: The Commissioner reserves the right to reject items incorporated into the work that fail to meet the specified minimum requirements. The Commissioner further reserves the right, and without prejudice to other recourse that maybe taken, to accept non-complying items subject to an adjustment in the Contract amount as approved by the City.

H. Applicable Regulations, Codes and Standards: Applicable standards listed in these Specifications include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. American National Standards Institute (ANSI)
(Successor to USASI and ASA)
25 West 43rd Street (between 5th and 6th Avenue) 4th Floor
New York, NY 10036
212-642-4900

2. American Society for Testing and Materials (ASTM)
100 Bar Harbor Drive
West Conshohocken, PA 19428-2959
610-832-9500

3. National Institute for Occupational Safety and Health (NIOSH)
Robert A. Taft Laboratory
4676 Columbia Pkwy
Mailstop R12 Cincinnati, Ohio 45226
513-841-4428

4. National Electrical Code (NEC)
See NFPA

5. National Fire Protection Association (NFPA)
   1 Batterymarch Park
   Quincy, Massachusetts 02169-7471
   617-770-3000

6. New York City Fire Department (FDNY)
   9 Metrotech Center
   Brooklyn, NY 11201-5431
   718-999-2117

7. New York City Department of Buildings (NYC DOB)
   Enforcement Division
   280 Broadway, New York, New York 10007
   212- 566-2850

8. New York City Department of Environmental Protection (NYCDEP)
   Bureau of Environmental Compliance
   Asbestos Control Program
   59-17 Junction Boulevard, 8th Floor
   Corona, New York 11368
   718-595-3682

9. New York City Department of Health and Mental Hygiene (NYC DOHMH)
   Environmental Investigation
   125 Worth Street
   New York, New York 10013
   212-442-3372

10. New York State Department of Labor (NYSDOL)
    Division of Safety and Health, Engineering Services Unit
    State Office Building Campus
    Albany, New York 12240-0010

11. New York City Department of Sanitation
    125 Worth Street, Room 714
    New York, New York 10013
    212-566-1066

12. Occupational Safety and Health Administration (OSHA)
    Region II - Regional Office
    201Varick Street, Room 908
    New York, New York 10014
    212-337-2378

13. United States Environmental Protection Agency (EPA or USEPA)
Region II
Asbestos NESHAPS Contact
Air and Waste Management Division
(Air Compliance Branch) – USEPA
290 Broadway, 21st Floor
New York, New York 10007-1866
212-637-3660

I. Post all applicable regulations in a conspicuous place at the job site. Assure that the regulations are not altered, defaced or covered by other materials. One copy of each regulation must also be kept at the Asbestos abatement contractor's office.

1.11 CITY/ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

A. The normal occupants of the Work Areas will be relocated by the City prior to the performance of the abatement work and returned there to at the conclusion of the abatement work, at no cost to the asbestos abatement contractor. However, the asbestos abatement contractor shall protect all furniture and equipment in the Work Areas in a manner as hereinafter specified. In addition, the asbestos abatement contractor shall perform the work of this Contract in a manner that will be least disruptive to the normal use of the non-Work Areas in the building.

B. Asbestos abatement contractor shall be responsible for cleaning all portable items not specifically addressed by the Facility, in the Work Areas, or dispose of same as asbestos contaminated waste.

C. Facility to provide asbestos abatement contractor with a list of items that cannot be removed and need special attention.

D. Facility to stop all deliveries that may be scheduled to the Work Area while work is in progress.

E. Facilities to have authorized personnel on site at all times or supply the asbestos abatement contractor with means of contacting such personnel without unreasonable delay. Such personnel shall have access to all areas, have knowledge of electrical, and air handling equipment. Such personnel shall assist the asbestos abatement contractor in case of any power failure or breakdown to shut down air supply systems, to reset and control all protective systems such as alarms, sprinklers, locks, etc. The Facility shall ensure no active air handling systems are operating within the Work Area.

F. City will not occupy the portions of the building, in which work is being performed during the entire asbestos removal operation, including completion of clean up.

G. Asbestos abatement contractor shall provide a plan for 24 hour job security both for prevention of theft and for barring entry of curious but unprotected personnel into Work Areas, as required by the Department.

H. Asbestos abatement contractor shall provide surveillance by a fire watch and set forth procedures to be taken for the safety of building occupants in the event of an emergency, in accordance with the WPSP and DEP regulations.

I. Should the failure of any utility occur, the City will not be responsible to the asbestos abatement contractor for loss of time or any other expense incurred.

J. Facility will be responsible to notify the asbestos abatement contractor of any planned electrical power shutdowns in order to ensure that there are no power interruptions in the negative air pressure systems.

K. Asbestos abatement contractor shall remove all flammable materials from the work area and all sources of ignition (including but not limited to pilot lights) shall be extinguished.

L. Asbestos abatement contractor shall require a competent person (as defined in OSHA 1926.1101) to perform the following functions and to be on-site continuously for the duration of the project:

1. Monitor the set up of the Work Area enclosure and ensure its integrity.

2. Control entry and exit into the work enclosure.

3. Ensure that employees are adequately trained in the use of engineering controls, proper work practices, proper personal protective equipment and in decontamination procedures.

4. Ensure that employees use proper engineering controls, proper work practices, proper personal protective equipment and proper decontamination procedures.

5. The competent person (as defined in OSHA1926.1101) shall check for rips and tears in work suits, and ensure that they are mended immediately or replaced.

1.12 USE OF BUILDING FACILITIES

A. City shall make available to the asbestos abatement contractor, from existing outlets and supplies, all reasonably required amounts of water and electric power at no charge.

B. Electric power to all Work Areas shall be shut down and locked out except for electrical equipment that must remain in service. Safe temporary power and lighting shall be provided by asbestos abatement contractor in accordance with applicable codes. All power to Work Areas shall be brought in from outside the area through ground-fault interrupter circuits installed at the source. Stationary electrical equipment within the Work Area, which must remain in service, shall be adequately protected, enclosed and ventilated. The Facility will identify all electric lines that must remain in service. Asbestos abatement contractor shall protect all lines.

C. Asbestos abatement contractor shall provide, at his own expense, all electrical, water, and waste connections, tie-ins, extensions, and construction materials, supplies, etc. All water tie-ins shall be hard piped with polyethylene or copper piping. At the end of each shift, asbestos abatement contractor shall disconnect all hoses within the work zone and place in equipment room of the worker decontamination unit. Asbestos abatement contractor shall ensure positive shutoff of all water to Work Area during non-working hours.

D. Utilities:

1. General:
   All temporary facilities required to be installed, shall be subject to the approval of the Commissioner. Prior to starting the work at any site; specify clearly the temporary locations of facilities preferably with sketches and submit the same to the Construction Project Manager for approval.

2. Water:
   The Department of Design and Construction will furnish all water needed for construction, at no cost to the asbestos abatement contractor in buildings under their jurisdiction. All temporary plumbing or adaptations to supply the needs of the Work Area shall be installed and removed by the asbestos abatement contractor and the cost thereof included in the Lump Sum price for abatement work. Shower water for the decontamination unit shall be provided hot. Heating of water, if necessary, shall be provided by the asbestos abatement contractor.

3. Electricity:
   The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the asbestos abatement contractor in buildings under their jurisdiction. All temporary electrical work or adaptations to supply the needs of the Work Area shall be installed and removed by the asbestos abatement contractor and the cost thereof included in the Lump Sum price for abatement work.

In leased spaces, arrangements for water supplies and electricity must be made with the landlord. However, all such arrangements must be made through and are subject to approval of the Department of Design and Construction. Utilities will be provided at no cost to the asbestos abatement contractor. However, it is the asbestos abatement contractor's (or the General contractor's) responsibility to furnish and install a suitable distribution system to the Work Area. This system will be provided at no cost to the City.

A dedicated power supply for the negative pressure ventilating units shall be utilized. The negative air equipment shall be on a ground fault circuit interrupter (GFCI) protected circuit separate from the remainder of the work area temporary power circuits.

E. Asbestos abatement contractor shall shut down and lock out all electric power to all work areas except for electrical equipment that must remain in service. Safe temporary power and lighting shall be provided in accordance with all applicable codes. Existing light sources (e.g., house lights) shall not be utilized. All power to work areas shall be brought in from outside the area through ground-fault circuit interrupter at the source.

1. If electrical circuits, machinery, and other electrical systems in or passing though the work area must stay in operation due to health and safety requirements, the following precautions must be taken:

   a. All unprotected cables, except low-voltage (less than 24 volts) communication and control system cables, panel boxes of cables and joints in live conduit that run through the work area shall be covered with three (3) independent layers of six (6) mil fire retardant polyethylene. Each layer shall be individually duct taped and sealed. All three (3) layers of polyethylene sheeting shall be left in place until satisfactory clearance air sampling results have been obtained.

   b. Any energized circuits remaining in the work area shall be posted with a minimum two (2) inch high lettering warning sign which reads: DANGER LIVE ELECTRICAL - KEEP CLEAR. A sign shall be placed on all live covered barriers at a maximum of ten (10) foot intervals. These signs shall be posted in sufficient numbers to warn all persons authorized to enter the work area of the existence of the energized circuits.

2. Any source of emergency lighting which is temporarily blocked as a result of work place preparation shall be replaced for the duration of the project by battery operated or temporary exit signs, exit lights, or photo luminescent path markings.

F. Asbestos abatement contractor shall provide a separate temporary electric panel board to power asbestos abatement contractor’s equipment. The Facility will designate an existing electrical source in proximity to the Work Area. Asbestos abatement contractor's licensed electrician shall provide temporary tie-in via cable, outlet boxes, junction boxes, receptacles and lights, all with ground fault interruption. At no time shall extension cords greater than 50-feet in length be allowed. All temporary electrical installation shall be in accordance with OSHA regulations. The electric shut down for power panel tie-in will be on off-hours and must be coordinated with the Facility. Asbestos abatement contractor shall provide to the City a specification and drawing outlining his power requirements at the pre-construction meeting.

G. Additional electrical equipment (i.e., transformers, etc.), which is necessary due to the lack of existing power on the floor, shall be at the asbestos abatement contractor's expense.

H. Asbestos abatement contractor shall provide fire protection in accordance with all State and Local fire codes.

I. Sprinklers, standpipes, and other fire suppression systems shall remain in service and shall not be plasticized.

J. When temporary service lines are no longer required, they shall be removed by the asbestos abatement contractor. Any parts of the permanent service lines, grounds and buildings, disturbed or damaged by the installation and/or removal of the temporary service lines, shall be restored to their original condition by asbestos abatement contractor. Senior Stationary Engineer will inspect and test all switches, controls, gauges, etc. and shall submit a list to the Construction Project Manager of any equipment damaged by the asbestos abatement contractor.

K. Asbestos abatement contractor shall supply hot shower water necessary for use in the decontamination unit.

1.13 USE OF THE PREMISES

A. Asbestos abatement contractor shall confine his apparatus, the storage of materials, and supplies, and the operation of his workmen to limits established by law, ordinances, and the directions of the Construction Project Manager and the Facility. All flammable or combustible materials shall be properly stored to obviate fire and in areas approved by the Facility.

B. Asbestos abatement contractor shall assure that no exits from the building are obstructed, that appropriate safety barriers are established to prevent access, and that Work Areas are kept neat, clean, and safe.

C. Asbestos abatement contractor shall maintain exits from the work area or alternative exits shall be established, in accordance with section 1027 of the New York City Fire Code. Exits shall be checked at the beginning and end of each work shift against blockage or impediments to exiting.

D. If the openings of temporary structural partitions related to abatement work areas block egress, the partition shall consist of two sheets of fire retardant 6-mil plastic, prominently marked as an exit with photo luminescent paint or signage. Cutting tools (e.g., knife, razor) shall be attached to the work area side of the sheeting for use in the event that the barrier must be cut open to allow egress.

E. All surrounding work, fixtures, soil lines, drains, water lines, gas pipes, electrical conduit, wires, utilities, duct work railings, shrubbery, landscaping, etc. which are to remain in place shall be carefully protected and, if disturbed or damaged, shall be repaired or replaced as directed by the City, at no additional cost.

F. All routes through the building to be used by the asbestos abatement contractor shall first be approved by the Construction Project Manager and the Facility.

G. Attention is specifically drawn to the fact that other asbestos abatement contractors, performing the work of other Contracts, may be (or are) brought upon any of the work sites of this Contract. Therefore, the asbestos abatement contractor shall not have exclusive rights to any site of his work and shall fully cooperate and coordinate his work with the work of other asbestos abatement contractors who may be on (or are on) any site of the work of this Contract. Regulated area exempted.

H. Temporary toilet facilities must be provided by the asbestos abatement contractor on the site. Coordinate location of facilities with Construction Project Manager. No toilet facilities will be allowed in the Work Area.

1.14 PROTECTION AND DAMAGE

A. The asbestos abatement contractor is responsible to cover all furniture and equipment that cannot be removed from Work Areas. Moveable furniture and equipment will be removed from Work Areas by asbestos abatement contractor prior to start of work and returned upon successful completion of the final air testing. At the conclusion of the work (after clearance level of air testing reaches the acceptable limit), the asbestos abatement contractor will remove all plastic covering from the walls, floors, furniture, equipment and reinstall furniture and equipment in the cleaned Work Area. The asbestos abatement contractor shall remove all shades, curtains and drapes from the Work Area, and reinstall the same following the final clean up.

B. Prior to plasticizing, the proposed work areas shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning methods. Methods that raise dust, such as sweeping or vacuuming with equipment not equipped with HEPA filters, are prohibited.

C. Use rubber tired vehicles that use non-volatile fuels for conveying material inside building and provide temporary covering, as necessary, to protect floors.

D. No materials or debris shall be thrown from windows or doors of the building. Building waste management system shall NOT be used to remove any asbestos waste from the building.

E. Debris shall be removed from the work site daily. Premises shall be left neat and clean after each work shift, so that work may proceed the next regular workday without interruption. Limited bag storage may take place within the Work Area when approved by the Construction Project Manager.

F. Protect floors and walls along removal routes from damage, wear and staining with contamination control flooring. All finished surfaces to be protected with Masonite or other rigid sheathing material.

G. A preliminary inspection for pre-existing damage shall be conducted by asbestos abatement contractor and representative of the City before commencement of the project.

1.15 RESPIRATORY PROTECTION REQUIREMENTS

A. Respiratory protection shall be worn by all individuals who may be exposed to asbestos fibers from the initiation of the asbestos project until all areas have successfully passed clearance air monitoring in accordance with Regulations and these Specifications.

B. Asbestos abatement contractor shall develop and implement a written respiratory protection program with required site-specific procedures and elements. The program shall be administered by a properly trained individual. The written respiratory protection program shall include the requirements set forth in OSHA Standard 29 CFR 1910.134, at a minimum.

C. The Asbestos abatement contractor shall provide workers with individually issued and marked respiratory equipment. Respiratory equipment shall be suitable for the asbestos exposure level(s) in the Work Area(s), as specified in OSHA Standards 26 CFR 1910.134 and 29 CFR 1926.1101, NIOSH Standard 42 CFR 84, or as more stringently specified otherwise, herein.

D. Where respirators with disposable filter parts are employed, the asbestos abatement contractor will provide sufficient filter parts for replacement as necessary or as required by the applicable regulation.

E. All respiratory protection shall be NIOSH approved. All respiratory protection shall be provided by asbestos abatement contractor, and used by workers in conjunction with the written respiratory protection program.

F. Asbestos abatement contractor shall provide respirators selected by an Industrial Hygienist that meet the following requirements:

Table 1. -- Assigned Protection Factors[5]

Type of Respirator[1,2]	Half mask	Full facepiece	Helmet/hood
1. Air-Purifying Respirator	[3]10	50	……
2. Powered Air-Purifying Respirator (PAPR)	50	1,000	[4]25/1,000
3. Supplied-Air Respirator (SAR) or Airline Respirator			
• Demand mode	10	50	……
• Continuous flow mode	50	1,000	[4]25/1,000
• Pressure-demand or other positive-pressure mode	50	1,000	……
4. Self-Contained Breathing Apparatus (SCBA)			
• Demand mode	10	50	50
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	……..	10,000	10,000

[1]Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

[2]The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

[3]This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

[4]The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

[5]These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

G. Selection of high efficiency filters:

1. All high efficiency filters shall have a nominal efficiency rating of 100 (99.97-percent effective) when tested against 0.3-micrometer monodisperse diethyl-hexyl phthalate (DOP) particles.

2. Choose N-, R-, or P-series filters based upon the presence or absence of oil particles.

a. N-series filters shall only be used for non-oil solid and water based aerosols or fumes.

b. R- and P-series filters shall be used when oil aerosols or fumes (i.e., lubricants, cutting fluids, glycerin, etc.) are present. The R-series filters are oil resistant and the P-series filters are oil proof.

c. Follow filter manufacture recommendations.

3. If a vapor hazard exists, use an organic vapor cartridge in combination with the high efficiency filter.

H. Historical airborne fiber level data may serve as the basis for selection of the level of respiratory protection to be used for an abatement task. Historical data provided by the asbestos abatement contractor shall be based on personal air monitoring performed during work operations closely resembling the processes, type of material, control methods, work practices, and environmental conditions present at the site. Documentation of aforementioned results may be requested by the City and/or Third-Party Air Monitor for review. This will not relieve the asbestos abatement contractor from providing personal air monitoring to determine the time-weighted average (TWA) for the work under contract. The TWA shall be determined in accordance with 29 CFR 1926.1101.

I. At no time during actual removal operations shall half-mask air purifying respirators be allowed unless a full 8-hour TWA and excursion limit have been conducted, and reviewed by the Construction Project Manager. If the TWA and excursion limit have not been conducted, a Supplied-Air Respirator (SAR) or Airline Respirator or Self-Contained Breathing Apparatus (SCBA) must be used. Use of single use dust respirators is prohibited for the above respiratory protection.

J. Workers shall be provided with personally issued and individually marked respirators. Respirators shall not be marked with any equipment that will alter the fit of the respirator in any way. Only waterproof identification markers shall be used.

K. Asbestos abatement contractor shall ensure that the workers are qualitatively or quantitatively fit tested by an Industrial Hygienist initially and every 12 months thereafter with the type of respirator he/she will be using.

L. Whenever the respirator design permits, workers shall perform the positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.

M. No facial hairs (beards) shall be permitted to be worn when wearing respiratory protection that requires a mask-to-face seal.

N. If a worker wears glasses, a spectacle kit to fit their respirator shall be provided by the asbestos abatement contractor at the asbestos abatement contractor's expense.

O. Respiratory protection maintenance and decontamination procedures shall meet the following requirements:

1. Respiratory protection shall be inspected and decontaminated on a daily basis in accordance with OSHA 29 CFR 1910.134 (b); and

2. High efficiency filters for negative pressure respirators shall be changed after each shower; and

3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures as stated in Section 3.03 and/or 3.04.

4. Airline respirators with high efficiency filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator face pieces shall be worn into the shower. Filtered/power pack assemblies shall be decontaminated in accordance with manufacturers recommendations; and

5. Respirators shall be stored in a dry place and in such a manner that the face-piece and exhalation valves are not distorted; and

6. Organic solvents shall not be used for washing of respirators.

P. Authorized visitors shall be provided with suitable respirators and instruction on the proper use of respirators whenever entering the Work Area. Qualitative fit test shall be done to ensure proper fit of respirator.

1.16 PROTECTIVE CLOTHING

A. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. Provide to all workers, foremen, superintendents, authorized visitors and inspectors, protective disposable clothing consisting of full body coveralls, head covers, gloves and 18-inch high boot type covers or reusable footwear.

B. In addition to personal protective equipment for workers, the asbestos abatement contractor shall make available at each worksite at least four (4) additional uniforms and required respiratory equipment each day for personnel who are authorized to inspect the work site. He/she shall also provide, for the duration of the work at any site involving a decontamination unit for worksite access, a lockable storage locker for use by the Construction Project Manager. In addition to respiratory masks for workers, the asbestos abatement contractor must have on hand at the beginning of each work day, at least four (4) masks each with three sets of fresh filters, for use by personnel who are authorized to inspect the worksite and

are medically qualified to don a respirator. The asbestos abatement contractor shall check for proper fit of the respirators of all City personnel authorized to enter the Work Area.

C. Asbestos handlers involved in tent procedures shall wear two (2) disposable suits, including gloves, hood and footwear, and appropriate respiratory equipment. All street clothes shall be removed and stored in a clean room within the work site. The double layer personal protective equipment shall be used for installation of the tent and throughout the procedure, if a decontamination unit (with shower and clean room) is contiguous to the Work Area, only one (1) layer of disposable personal protective equipment shall be required; in this case, prior to exiting the tent the worker shall HEPA vacuum and wet clean the disposable suit.

D. The outer disposable suit (if 2 suits are worn) shall be removed and remain in the tent upon exiting. Following the tent disposal and work site clean up the workers shall immediately proceed to a shower at the work site. The inner disposal unit and respirator shall be removed in the shower after appropriate wetting. The disposal clothing shall be disposed of as asbestos-containing waste material. The workers shall then fully and vigorously shower with supplied liquid bath soap, shampoo, and clean dry towels.

E. Coveralls: provide disposable full-body coveralls and disposable head covers. Require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes for all workers in the Work Area.

F. Boots: provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers. Paint uppers of all boots yellow with waterproof enamel. Do not allow boots to be removed from the Work Area for any reason after being contaminated with ACM and/or dust.

G. Hard Hats: provide hard hats as required by OSHA for all workers, and provide a minimum of four spares for Inspectors, visitors, etc. Label all hats with same warning label as used on disposal bags. Require hard hats to be worn at all times that work is in progress that may cause potential head injury. Provide hard hats of the type with polyethylene strap suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean and decontaminate and bag hard hats prior to removing them from the Work Area at the end of the work.

H. Goggles: provide eye protection (goggles) as required by OSHA for all workers involved in any activity that may potentially cause eye injury. Require them to be worn at all times during these activities. Thoroughly clean and decontaminate goggles before removing them from the Work Area.

I. Gloves: provide work gloves to all workers, of the type dictated by the Work and OSHA Standards. Do not remove gloves from the Work Area. Dispose of as asbestos contaminated waste at the end of the work. Gloves shall be worn at all times, except during Work Area Preparation activities that do not disturb ACM.

J. Reusable footwear, hard hats and eye protection devices shall be left in the contaminated Equipment Room until the end of the Asbestos Abatement Work.

K. Disposable protective clothing shall be discarded and disposed of as asbestos waste every time the wearer exits from the workspace to the outside through the decontamination facility.

L. Adequate supplies of disposable coveralls, head covers and foot covers shall be maintained by the asbestos abatement contractor for authorized representatives who may inspect the Work Area.

1.17 AIR MONITORING - ASBESTOS ABATEMENT CONTRACTOR

A. Asbestos abatement contractor shall employ a qualified industrial hygiene firm to conduct OSHA personal exposure monitoring air samples in accordance with OSHA Regulations, 1926.1101 (Asbestos Standards for Construction) to establish representative full shift monitoring data, per task, to determine respiratory protection. The asbestos abatement contractor may submit representative Personal exposure monitoring data for a project of similar size and complexity in lieu of performing monitoring in accordance with OSHA 29CFR 1926.1101.

B. The asbestos abatement contractor shall ensure that a qualified industrial hygiene laboratory for OSHA personal exposure monitoring is utilized. Such laboratory shall be a current proficient participant in the American Industrial Hygiene Association (AIHA) PAT Program. The laboratory shall be accredited by the AIHA and New York State Department of Health Environmental Laboratory Approval Program (ELAP).

C. Sampling and analysis methods shall be per NIOSH 7400A.

D. Test Reports:

1. Promptly process and distribute one copy of the test results, to the Commissioner via email.

2. Prompt reports are necessary so that if required, modifications to work methods and/or practices may be implemented as soon as possible.

3. Asbestos abatement contractor shall post the personal exposure monitoring results at the jobsite within 24 hours of receipt of the results.

E. Competent person shall conduct inspections and provide written reports daily. Inspections will include checking the standard operating procedures, engineering control systems, respiratory protection and decontamination systems, packaging and disposal of asbestos waste, and any other aspects of the project which may affect the health and safety of the people and environment.

F. All costs for required the asbestos abatement contractor's air monitoring shall be borne by the asbestos abatement contractor.

G. The City reserves the right to conduct air and surface dust sampling in conjunction with and separate from the Third-Party Air Monitor for the purposes of Quality Assurance.

1.18 THIRD PARTY MONITORING AND LABORATORY

A. The NYCDDC, at its own expense, will employ the services of an independent Third Party Air Monitoring Firm and Laboratory. The Third Party Air Monitor will perform air sampling activities and project monitoring at the Work Site.

B. The Laboratory will perform analysis of air samples utilizing Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM). This laboratory shall meet the standards stated in Paragraph 1.17. B.

C. Observations will include, but not be limited to, checking the standard operating procedures, engineering control systems, respiratory protection, decontamination systems, packaging and disposal of asbestos waste, and any other aspects of the project that may affect the health and safety of the environment, Asbestos abatement contractor, and/or facility occupants.

D. The Third Party Air Monitoring Firm and the designated Project Monitor shall have access to all areas of the asbestos removal project at all times and shall continuously inspect and monitor the performance of the asbestos abatement contractor to verify that said performance complies with this Specification. The Third-Party Air Monitor shall be on site throughout the entire abatement operation.

E. The NYCDDC will be responsible for costs incurred with the Third Party Air Monitoring Firm and laboratory work. Any subsequent additional testing required due to limits exceeded during initial testing shall be paid for by the Asbestos abatement contractor.

F. At a minimum, air sampling shall be conducted in accordance with the following schedule:

Abatement Activity	Pre-Abatement	During Abatement	Post- Abatement
Equal to or greater than 10,000 square feet or 10,000 linear feet of ACM	PCM	PCM	TEM
Less than 10,000 square feet or 10,000 linear feet of ACM	PCM	PCM	PCM

Note: TEM is acceptable wherever PCM is required.

G. The number of air samples required per stage of abatement and size of abatement project is listed in the table below:

		Pre-Abatement	During Abatement	Post Abatement
	Large Asbestos Projects			
1.	Full Containment	10	5	10
2.	Glovebag inside Tent	5[a]	5[a]	5[a]
3.	Exterior Foam and Vertical Surfaces	-	5[c]	5[d]
4.	Interior Foam	10	5[c]	10[d]
	Small Asbestos Projects			
1.	Full Containment	6	3	6
2.	Glovebag inside Tent	3[b]	3[b]	3[b]
3.	Tent	3[b]	3[b]	3[b]
4.	Exterior Foam and Vertical Surfaces	-	3[c]	3[d]
5.	Interior Foam	6	3[c]	6[d]
	Minor Projects			
1.	Glovebag inside Tent	-	-	1[d]
2.	Tent	-	-	1[d]
3.	Exterior Foam and Vertical Surfaces	-	-	1[d]
4.	Interior Foam	-	-	1[d]

[a] if more than three (3) tents then two (2) samples required per enclosure.

[b] if more than three (3) tents then one (1) sample required per enclosure.

[c] samples shall be taken within the work area(s).

[d] area sampling is required only if:

- visible emissions are detected during the project
- during-abatement area sampling results exceeded 0.01 f/cc or the pre-abatement area sampling result(s) for interior projects where applicable.
- work area to be reoccupied is an interior space at a school, healthcare, or daycare facility.

H. Prior to commencement of abatement activities, the Third Party Air Monitoring Firm will collect a minimum number of area samples inside each homogeneous work area.

1. Samples will be taken during normal occupancy activities and circumstances at the work site.

2. Samplers shall be located within the proposed work area and at all proposed isolation barrier locations.

3. Samples shall be analyzed using PCM.

4. The number of samples to be collected will be determined by the size of the project and the abatement methods to be utilized.

I. Frequency and duration of the air sampling during abatement shall be representative of the actual conditions during the abatement. The size of the asbestos project will be a factor in the number of samples required to monitor the abatement activities. The following minimum schedule of samples shall be required daily.

1. For large asbestos projects employing full containment, area air sampling shall be performed at the following locations:

a. Two area samples outside the work area in uncontaminated areas of the building, remote from the decontamination facilities.

(1) Primary location selection shall be within 10 feet of isolation barriers.

(2) Where negative ventilation exhaust runs through uncontaminated building areas, one of the area samples will be required in these areas to monitor any potential fiber release.

(3) Where exhaust tubes have been grouped together in banks of up to five (5) tubes, with each tube exhausting separately and the bank of tubes terminating together at the same controlled area, one area air sample shall be taken.

b. One area sample within the uncontaminated entrance to each decontamination enclosure system.

c. Where adjacent non-work areas do not exist, an exterior area sample shall be taken.

d. One area sample within 5 feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors but not within a duct.

e. One area sample outside, but within 25 feet of, the building or structure, if the entire building or structure is the work area.

2. For large asbestos projects involving interior foam method, area air sampling shall be performed at the following sampling locations:

    a. One area sample taken outside the work area within 10 feet of isolation barriers.

    b. One area sample taken within the uncontaminated entrance to each worker decontamination and waste decontamination enclosure system.

    c. One area sample within 5 feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors but not within a duct, if applicable.

    d. Three area samples inside the work area.

    e. One area sample where the negative ventilation exhaust ducting runs through uncontaminated building areas, if applicable.

3. For large asbestos projects employing the glovebag procedure within a tent, a minimum of five continuous air samples shall be taken concurrently with the abatement for each work area, unless there are more than three enclosures, in which case two area samples per enclosure are required.

    a. Four area samples taken outside the work area within ten feet of tent enclosure(s).

    b. One area sample taken within the uncontaminated entrance to each worker and waste decontamination enclosure system.

    c. One area sample within five feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors, but not within a duct, if applicable.

    d. One area sample where negative ventilation exhaust ducting runs through uncontaminated building areas, if applicable.

4. For large asbestos projects involving exterior foam method or removal of ACM from vertical surfaces, a minimum of five continuous area samples shall be taken concurrently with the abatement for each work area using the following minimum requirements:

    a. Three area samples inside the work area and remote from the decontamination systems.

b. One area sample within the uncontaminated entrance to each worker and waste decontamination enclosure system.

c. One area sample outside the work area within 25 feet of the building or structure, if the entire building or structure is the work area.

d. One area sample inside the building or structure at the egress point to the work area, if applicable.

5. For small asbestos projects employing full containment, a minimum of three continuous area samples shall be taken concurrently with the abatement for each work area at the following locations:

a. Two area samples taken outside the work area within ten feet of the isolation barriers.

b. One area sample within the uncontaminated entrance to each worker or waste decontamination enclosure system.

c. One area sample within five feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors, but not within a duct, if applicable.

d. One area sample where negative ventilation exhaust ducting runs through an uncontaminated building area, if applicable.

6. Tent Procedures:
For projects involving more than 25 linear feet or 10 square feet, a minimum of three continuous samples shall be taken concurrently throughout abatement.

J. Post-abatement clearance air monitoring for projects not solely employing glove-bag procedures shall include a minimum number of area samples inside each homogeneous work area and outside each homogeneous work area (five samples inside/five samples outside for Large Projects and three samples inside/three samples outside for Small Projects). In addition to the five sample inside/five sample outside minimum for Large Projects, one additional representative area sample shall be collected inside and outside the work area for every 5,000 square feet above 25,000 square feet of floor space where ACM has been abated.

K. Post-abatement clearance air monitoring for Small Projects solely employing glove-bag procedures is not required unless one or more of the following events occurs. In such cases, post-abatement clearance air monitoring procedures shall be followed. The events requiring post-abatement clearance air monitoring are:

1. The integrity of the glove-bag was compromised,

2. Visible emissions are detected outside the glove-bag, and/or

3. Ambient levels exceed 0.01 f/cc during abatement.

L. Monitoring requirements for other than post-abatement clearance air monitoring are as follows:

1. The sampling zone for indoor air samples shall be representative of the building occupants' breathing zone.

2. If possible, outdoor ambient and baseline samplers should be placed about 6 feet above the ground surface in reasonable proximity to the building and away from obstructions and drafts that may unduly affect airflow.

3. For outdoor samples, if access to electricity and concerns about security dictate a rooftop site, locations near vents and other structures on the roof that would unduly affect airflow shall be avoided.

4. Air sampling equipment shall not be placed in corners of rooms or near obstructions such as furniture.

5. Samples shall have a chain of custody record.

M. Post-abatement clearance air monitoring requirements are as follows:

1. Sampling shall not begin until at least one hour after wet cleaning has been completed and no visible pools of water or condensation remain.

2. Samplers shall be placed at random around the work area. If the work area contains the number of rooms equivalent to the number of required samples based on floor area, a sampler shall be placed in each room. When the number of rooms is greater than the required number of samples, a representative sample of rooms shall be selected.

3. The representative samplers placed outside the work area but within the building shall be located to avoid any air that might escape through the isolation barriers and shall be approximately 50 feet from the entrance to the work area, and 25 feet from the isolation barriers.

N. The following aggressive sampling procedures shall be used within the work area during all clearance air monitoring:

1. Before starting the sampling pumps, use forced air equipment (such as a one horsepower leaf blower) to direct exhaust air against all walls, ceilings, floors, ledges and other surfaces in the work area. This pre-sampling procedure shall take at least five minutes per 1,000 square feet of floor area; then

2. Place a 20-inch diameter fan in the center of the room. Use one fan per 10,000 cubic feet of room space. Place the fan on slow speed and point it toward the ceiling.

3. Start the sampling pumps and sample for the required time or volume.

4. Turn off the pump and then the fan(s) when sampling is completed.

5. Collect a minimum number of area samples inside and outside each homogeneous work area (five inside/five outside samples for Large Projects and three inside/three outside samples for Small Projects). In addition to the minimum for Large Projects, one representative area samples shall be collected inside and outside the work area for every 5,000 square feet above 25,000 square feet of floor space where ACM has been abated.

O. For post-abatement monitoring, area samples shall conform to the following schedule:

Area Samples for Analysis by	Minimum Volume	Flow Rate
PCM	1,800 liters	5 to 15 liters/minute
TEM	1,250 liters	1 to 10 liters/minute

1. Each homogeneous work area that does not meet the clearance criteria shall be thoroughly re-cleaned using wet methods, with the negative pressure ventilation system in operation. New samples shall be collected in the work area as described above. The process shall be repeated until the work site meets the clearance criteria.

2. For an asbestos project with more than one homogeneous work area, the release criterion shall be applied independently to each work area.

3. Should airborne fiber concentrations exceed the clearance criteria, the asbestos abatement contractor shall re-clean the work area utilizing wet wiping and HEPA-vacuuming techniques. Following completion of re-cleaning activities, the Third-Party Air Monitor will perform an observation of the Work Area. If the Third-Party Air Monitor determines that the work was performed in accordance with the specifications, the appropriate settling period will be observed and additional air sampling will be performed.

4. All costs resulting from additional air tests and observations shall be borne by the asbestos abatement contractor. These costs may include, but are not limited to, labor, analysis fees, materials, and expenses.

5. After the area has been found to be in compliance, the asbestos abatement contractor may remove Isolation Barriers and perform final cleaning as specified.

P. Clearance and/or Re-occupancy Criteria:

1. The clearance criteria shall be applied to each homogeneous work area independently.

2. For PCM analysis, the clearance air monitoring shall be considered satisfactory when each of the 5 inside/5 outside samples for Large Projects and/or 3 inside/3 outside samples for Small Projects is less than or equal to 0.01 f/cc or the background concentrations, whichever is greater.

3. For TEM analysis, the clearance air monitoring shall be considered satisfactory when the requirements stated in 40 CFR Part 763, Subpart E, Appendix A, Section IV are met.

4. As soon as the air monitoring tests are completed and analyzed, the Third-Party Air Monitor will send the results of such tests to the City and notify the Asbestos abatement contractor.

5. The asbestos abatement contractor shall initiate the appropriate closeout process in DEP ARTS within 24 hours of the Re-occupancy letter being issued by the Third-Party Air Monitoring Firm. This will allow the Third-Party Air Monitoring Firm to complete and submit the ACP-15 forms for each specific work area.

6. The asbestos abatement contractor shall provide the ACP-20 and ACP-21 forms to the general contractor within 48 hours of receipt by DEP.

1.19 TAMPERING WITH TEST EQUIPMENT

All parties to this Contract are hereby notified that any tampering with testing equipment will be considered an attempt at falsifying reports and records to federal and state agencies and each offense will be prosecuted under applicable state and federal criminal codes to the fullest extent possible.

1.20 GUARANTEE

A. Work performed in compliance with this Contract shall be guaranteed for a period of one year from the date the completed work is accepted by the City.

B. The asbestos abatement contractor shall not be held liable for the guarantee where the repair required under the guarantee is a result of obvious abuse or vandalism, as determined by the Commissioner.

C. The City will notify the asbestos abatement contractor in writing regarding defects in work under the guarantee.

PART 2 – PRODUCTS

2.01 MATERIAL HANDLING

A. Deliver all materials to the job site in their manufacturer's original container, with the manufacturer's label intact and legible.

1. Maintain packaged materials with seals unbroken and labels intact until time of use.

2. Store all materials on pallets, away from any damp and/or wet surface. Cover materials in order to prevent damage and/or contamination.

3. Promptly remove damaged materials and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the City.

B. The Construction Project Manager may reject as non-complying such material and products that do not bear identification satisfactory to the Construction Project Manager as to manufacturer, grade, quality and other pertinent information.

2.02 MATERIALS

A. Wetting agents: (Surfactant) shall consist of resin materials in a water base, which have been tested to ensure materials are non-toxic and non-hazardous. Surfactants shall be installed according to the manufacturer's written instructions.

B. Encapsulants: Liquid material which can be applied to asbestos-containing material which temporarily controls the possible release of asbestos fibers from the material or surface either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.

C. During abatement activities, replacement materials shall be stored outside the work area in a manner to prevent contamination. Materials required for the asbestos project (i.e., plastic sheeting, replacement filters, duct tape, etc.) shall be stored to prevent damage or contamination.

D. Framing Materials and Doors: As required to construct temporary decontamination facilities and isolation barriers. Lumber shall be high grade, new, finished one side and fire retardant.

E. Fire Retardant Polyethylene Sheeting: minimum uniform thickness of 6-mil. Provide largest size possible to minimize seams. All materials used in the construction of temporary enclosures shall be noncombustible or fire-retardant in accordance with NFPA 701 and 255.

F. Fire Retardant Reinforced Polyethylene Sheeting: For covering floor of decontamination units, provide translucent, nylon reinforced or woven polyethylene laminated, fire retardant polyethylene sheeting. Provide largest size possible to minimize seams, minimum uniform thickness 6-mil. All materials used in the construction of temporary enclosures shall be noncombustible or fire-retardant in accordance with NFPA 701 and 255.

G. Drums: Asbestos-transporting drums, sealable and clearly marked with warning labels as required by OSHA and EPA.

H. Polyethylene Disposal Bags: Asbestos disposal bags, minimum of fire retardant 6-mil thick. Bags shall be clearly marked with warning labels as required by OSHA and EPA.

I. Signs: Asbestos warning signs for posting at perimeter of Work Area, as required by OSHA and EPA.

J. Waste Container Bag Liners and Flexible Trailer Trays: One piece leak-resistant flexible tray with absorbent pad.

K. Tape: Provide tape which is of high quality with an adhesive that is formulated to aggressively stick to sheet polyethylene.

L. Spray Adhesive: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

M. Flexible Duct: Spiral reinforced flex duct for air filtration devices.

N. Protective Clothing: Workers shall be provided with sufficient sets of properly fitting, full-body, disposable coveralls, head covers, gloves, and 18-inch high boot-type foot covers. Protective clothing shall conform to OSHA Standard 29 CFR 1926.1101.

O. Surfactants, strippers, sealers, or any other chemicals used shall be non-carcinogenic and non-toxic.

P. Materials used in the construction of temporary enclosures shall be noncombustible or fire-retardant in accordance with NFPA 701 and 255.

2.03 TOOLS AND EQUIPMENT

A. Air Filtration Device (AFD): AFDs shall be equipped with High Efficiency Particulate Air (HEPA) filtration systems and shall be approved by and listed with Underwriter's Laboratory.

B. Scaffolding: All scaffolding shall be designed and constructed in accordance with OSHA (29 CFR 1926/1910), New York City Building Code, and any other applicable federal, state and local government regulations. Whenever there is a conflict or overlap of the above references the most stringent provisions are applicable. All scaffolding and components shall be capable of supporting without failure a minimum of four times the maximum intended load, plus an allowance for impact. All scaffolding and staging must be certified in writing by a Professional Engineer licensed to practice in the State of New York.

1. Equip rungs of all metal ladders, etc., with an abrasive, non-slip surface.

2. Provide non-skid surface on all scaffold surfaces subject to foot traffic. Scaffold ends and joints shall be sealed with tape to prevent penetration of asbestos fibers.

C. Transportation Equipment: Transportation Equipment, as required, shall be suitable for loading, temporary storage, transit and unloading of asbestos contaminated waste without exposure to persons or property. Any temporary storage containers positioned outside the building for temporary storage shall be metal, closed and locked.

D. Vacuum Equipment: All vacuum equipment utilized in the Work Area shall utilize HEPA filtration systems.

E. Vacuum Attachments: Soft Brush Attachment, Asbestos Scraper Tool, Drill Dust Control Kit.

F. Electric Sprayer: An electric airless sprayer suitable for application of encapsulating material and shall be approved by and listed with Underwriters Laboratory.

G. Water Sprayer: The water sprayer shall be an airless or other low-pressure sprayer for amended water application.

H. Water Atomizer: Powered air-misting device equipped with a ground fault interrupter and equipped to operate continuously.

I. Brushes: All brushes shall have nylon bristles. Wire brushes are excluded from use due to their potential to shred asbestos fibers into small, fine fibers.

J. Power tools used to drill, cut into, or otherwise disturb ACM shall be manufacturer-equipped with HEPA filtered local exhaust ventilation. Abrasive removal methods, including the use of beadblasters, are prohibited.

K. Other Tools and Equipment: Asbestos abatement contractor shall provide other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: hand-held scrapers, sponges, rounded-edge shovels, brooms, and carts.

L. Fans and Leaf Blower: Provide Leaf Blower (one leaf blower per floor) and one 20-inch diameter fans for each 10,000 cubic feet of Work Area volume to be used for aggressive sampling technique for clearance air testing.

M. Fire Extinguishers: At least one fire extinguisher with a minimum rating 2-A:10-B:C shall be required for each work place. In the case of large asbestos projects, at least two such fire extinguishers shall be required.

N. First Aid Kits: Asbestos abatement contractor shall maintain adequately stocked first aid kits in the clean rooms of the decontamination units and within Work Areas. The first aid kit shall be approved by a licensed physician for the work to be performed under this Contract.

O. Water Service:

1. Temporary Water Service Connection: All connections to the Facilities water system shall include back flow protection. Valves shall be temperature and pressure rated for operation of the temperature and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping, and equipment. Leaking or dripping fittings/valves shall be repaired and or replaced as required.

2. Water Hoses: Employ new heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into each Work Area and to each Decontamination Enclosure Unit. Provide fittings as required for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.

3. Water Heater: Provide UL rated 40-gallon electric water heaters to supply hot water for Personal Decontamination Enclosure System Shower. Activate from 30 Amp Circuit breakers located within the Decontamination Enclosure sub panel. Provide relief valve compatible with water heater operations, pipe relief valve down to drip pan at floor level with type 'L'

copper piping. Drip pans shall be 6-inch deep and securely fastened to water heater. Wiring of the water heater shall comply with NEMA, NECA, and UL standards.

P. Electrical Service:

1. General: Comply with applicable NEMA, NEC and UL standards and governing regulations for materials and layout of temporary electric service.

2. Temporary Power: Provide service to decontamination unit sub panel with minimum 60 AMP, two pole circuit breaker or fused disconnect connected to the building's main distribution panel. Sub panel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work.

3. Voltage Differences: Provide identification warning signs at power outlets that are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.

4. Ground Fault Protection: Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate the GFCIs outside the Work Area so that all circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for all circuits to be used for any purpose in Work Area, decontamination units, exterior, or as otherwise required by NECA, OSHA or other authority.

5. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead, and rise vertically where wiring will be least subject to damage from operations.

6. Temporary Wiring: In the Work Area shall be type UF non-metallic sheathed cable located overhead and exposed for surveillance. Provide liquid tight enclosures or boxes for all wiring devices. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors.

7. Electrical Power Cords: Use only grounded extension cords; use hard service cords where exposed to traffic and abrasion. Use single lengths of cords only.

8. Temporary Lighting: All lighting within the Work Area shall be liquid and moisture proof and designed for the use intended.

a. Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, and portable plug-in task lighting.

b. Provide lighting in the Decontamination Unit as required to supply a minimum 50-foot candle light level.

9. If electrical circuits, machinery, and other electrical systems in or passing though the work area must stay in operation due to health and safety requirements, the following precautions must be taken:

a. All unprotected cables, except low-voltage (less than 24 volts) communication and control system cables, panel boxes of cables and joints in live conduit that run through the work area shall be covered with three (3) independent layers of six (6) mil fire retardant polyethylene. Each layer shall be individually duct taped and sealed. All three (3) layers of polyethylene sheeting shall be left in place until satisfactory clearance air sampling results have been obtained.

2.04 CLEANING

A. Throughout the construction period, the asbestos abatement contractor shall maintain the building as described in this Section.

1. The asbestos abatement contractor shall prevent building areas other than the Work Area from becoming contaminated with asbestos-containing dust or debris. Should areas outside the Work Area become contaminated with asbestos-containing dust or debris as a consequence of the asbestos abatement contractor's work practices, the asbestos abatement contractor shall be responsible for cleaning these areas in accordance with the procedures appended in Title 15, Chapter 1 of RCNY and NYSDOL ICR56. All costs incurred in cleaning or otherwise decontaminating non-Work Areas and the contents thereof shall be borne by the asbestos abatement contractor at no additional cost to the City.

2. The asbestos abatement contractor shall provide to all personnel and laborers the required equipment and materials needed to maintain the specified standard of cleanliness.

B. General

1. Waste water from asbestos removal operations, including shower water, may be discharged into the public sewer system only after approved filtration is on operation to remove asbestos fibers.

2. Asbestos wastes shall be double bagged in six mil fire retardant polyethylene bags approved for ACM disposal and shall be properly labeled and handled before disposal.

3. All waste generated shall be bagged, wrapped or containerized immediately upon removal. The personal and waste decontamination enclosure systems and floor and scaffold surfaces shall be HEPA vacuumed and wet cleaned at the end of each work shift at a minimum.

4. The asbestos abatement contractor shall use corrugated cartons or drums for disposal of asbestos-containing waste having sharp edged components (e.g., nails, screws, metal lathe and tin sheeting) that may tear polyethylene bags and sheeting. The waste within the drums or cartons must be double bagged.

5. The asbestos abatement contractor shall transport all bags of waste to disposal site in thirty gallon capacity metal or fiber drums with tight lids, or in locked steel dumpster.

6. Dumping of debris, waste or bagged waste will not be permitted.

7. The waste decontamination enclosure system shall be wet cleaned twice using wet cleaning methods upon completion of waste removal. When the worker decontamination enclosure shower room alternates as a waste container wash room, the shower room shall be washed immediately with cloths or mops saturated with a detergent solution prior to wet cleaning.

8. Excessive water accumulation or flooding in the work area shall require work to stop until the water is collected and disposed of properly.

9. ACM shall be collected utilizing rubber dust pans and rubber squeegees.

10. HEPA vacuums shall not be used on wet materials unless specifically designed for that purpose.

11. Metal shovels shall not be used within the work area.

12. Mastic solvent when used will be applied in moderation (e.g., by airless sprayer). Saturation of the concrete floor with mastic solvent must be avoided.

13. The asbestos abatement contractor shall retain all items in the storage area in an orderly arrangement allowing maximum access, not impeding traffic, and providing the required protection of all materials.

14. The asbestos abatement contractor shall not allow accumulation of scrap, debris, waste material, and other items not required for use in this work. When asbestos contaminated waste must be kept on the work site overnight or longer, it shall be double bagged and stored in accordance with New York City Department of Sanitation (DSNY) regulation Title 16 Chapter 8, and Federal, State and City laws.

15. At least twice a week (more if necessary), the asbestos abatement contractor shall completely remove all scrap, debris and waste material from the job site.

16. The asbestos abatement contractor shall provide adequate storage space for all items awaiting removal from the job site, observing all requirements for fire protection and concerns for the environment.

17. All respiratory protection equipment shall be selected from the latest NIOSH Certified Equipment list.

18. Daily and more often, if necessary, the asbestos abatement contractor shall inspect the Work Areas and adjoining spaces, and pick up all scrap, debris, and waste material. All such items shall be removed to the place designated for their storage.

19. Weekly, and more often, if necessary, the asbestos abatement contractor shall inspect all arrangements of materials stored on the site; re-stack and tidy them or otherwise service them to meet the requirements of these Specifications.

20. The asbestos abatement contractor shall maintain the site in a neat and orderly condition at all times.

PART 3 – EXECUTION

3.01 WORKER DECONTAMINATION FACILITY

A. Large Asbestos Projects:

1. Provide a worker decontamination facility in accordance with, Title 15, Chapter 1, OSHA Standard 29 CFR 1926.1101, 12NYCRR Part 56 and as specified herein. Unless approved by NYCDEP and the City, worker decontamination facilities shall be attached to the Work Areas

a. Structure:

(1) Use modular systems or build using wood or metal frame studs, joists, and rafters placed at a maximum of 16 inches on-center.

(2) When worker decontamination unit is located outdoors, in areas with public access, or in correctional facilities, frame work shall be lined with minimum 3/8" thickness fire rated plywood sheathing. Sheathing shall be caulked or taped airtight at all joints and seams.

(3) Interior shall be covered with two layers of fire retardant 6-mil polyethylene sheeting, with a minimum overlap of 12 inches at seams. Seal seams airtight using tape and adhesive. The interior floor shall be covered with two (2) layers of reinforced fire-retardant polyethylene sheeting with a minimum overlap on the walls of 12 inches.

(4) Entrances to the decontamination unit shall be secured with lockable hinged doors. Doors shall be open at all times when abatement operations are in progress. Doors shall be louvered to allow for air movement through the decontamination units into Work Area.

b. Curtained Doorways: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms.

c. Air Locks: Air locks shall consist of two curtained doorways placed a minimum of three feet apart. The curtained doorways shall consist of 3 overlapping sheets of fire retardant 6-mil polyethylene sheeting, with alternating entrances and weighted at the bottom.

d. Decontamination Enclosure System shall be placed adjacent to the Work Area and shall consist of three totally enclosed chambers, separated from Work Area and each other by airlocks, as follows:

(1) Equipment Room: The equipment room shall have a curtain doorway to separate it from the Work Area, and share a common airlock with the shower room. The equipment room shall be large enough to accommodate at least one worker (allowing them enough room to remove their protective clothing and footwear), and a fire retardant 6-mil disposal bag for collection of discarded clothing and equipment. The equipment room shall be utilized for the storage of equipment

and tools after decontamination using a HEPA-vacuum and/or wet cleaning. A one-day supply of replacement filters, in sealed containers, for HEPA-vacuums and negative air machines, extra tools, containers of surfactant, and other materials and equipment required for the project shall be stored here. A walk-off pan filled with water shall be placed in the Work Area just outside the equipment room for persons to clean foot coverings when leaving the Work Area. Contaminated footwear and reusable work clothing shall be stored in this room.

(2) Shower Room: The shower room shall have two airlocks (one that separates it from the equipment room and one that separates it from the clean room). The shower room shall contain at least one shower, with hot and cold water adjustable at the tap, per six workers. Careful attention shall be given to the shower to ensure against leaking of any kind and shall contain a rigid catch basin at least six inches deep. Asbestos abatement contractor shall supply towels, shampoo and liquid soap in the shower room at all times. Shower water shall be continuously drained, collected, and filtered through a system with at least a 5-micron particle size collection capacity. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filters by large particles. Pumps shall be installed, maintained and utilized in accordance with manufacturer's recommendations. Filtered water shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.

(3) Clean Room: The clean room shall share a common airlock with the shower room and shall have a curtained doorway to separate it from outside non-contaminated areas. Lockers, for storage of workers' street clothing, and shelves, for storing respirators, shall be provided in this area. Clean disposable clothing, replacement filters for respirators, and clean dry towels shall be provided in the clean room. The clean room shall not be used for the storage of tools, equipment or other materials.

B. Small Asbestos Projects:

1. Provide a worker decontamination facility in accordance with, Title 15, Chapter 1, OSHA Standard 29 CFR 1926.1101, 12NYCRR Part 56 and as specified herein. Unless approved by NYCDEP and the City, worker decontamination facilities shall be attached to the Work Areas.

2. The worker decontamination enclosure system shall consist of, at a minimum, an equipment room, a shower room, and a clean room separated from each other and from the work area by curtained doorways. The equipment storage, personnel gross decontamination and removal of disposal clothing shall occur in the equipment room prior to entering the shower. All other requirements shall be the same as described above for a large asbestos project.

3. For small asbestos projects with only one exit from the work area, the shower room may be used as a waste washroom. The clean room shall not be used for waste storage. All other requirements shall be the same as described above for a large asbestos project.

C. Decontamination Enclosure System Utilities: Lighting, heat, and electricity shall be provided as necessary by the Asbestos abatement contractor, and as specified herein.

3.02 WASTE DECONTAMINATION FACILITY

A. Large Asbestos Project (Small Project Option)

1. Provide a worker decontamination facility in accordance with, Title 15, Chapter 1, OSHA Standard 29 CFR 1926.1101, 12NYCRR Part 56 and as specified herein. Unless approved by NYCDEP and the City, worker decontamination facilities shall be attached to the Work Areas.

a. Structure:

(1) Use modular systems or build using wood or metal frame studs, joists, and rafters placed at a maximum of 16 inches on-center.

(2) When worker decontamination unit is located outdoors, in areas with public access, or in correctional facilities, frame work shall be lined with minimum 3/8” thickness fire rated plywood sheathing. Sheathing shall be caulked or taped airtight at all joints and seams.

(3) Interior walls shall be covered with two layers of fire retardant 6-mil polyethylene sheeting, with a minimum overlap of 12 inches at seams. Seal seams airtight using tape and adhesive. The interior floor shall be covered with two (2) layers of reinforced fire-retardant polyethylene sheeting with a minimum overlap on the walls of 12 inches.

(4) Entrances to the decontamination unit shall be secured with lockable hinged doors. Doors shall be open at all times when abatement operations are in progress. Doors shall be louvered to allow for air movement through the decontamination units into the Work Area.

b. Curtained Doorways: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms.

c. Air Locks: Air locks shall consist of two curtained doorways placed a minimum of three feet apart. The curtained doorways shall consist of 3 overlapping sheets of fire retardant 6-mil polyethylene sheeting, with alternating entrances and weighted at the bottom.

d. Decontamination Enclosure System shall be located outside the work area and attached to all locations through which ACM waste will be removed from the work area and shall consist of two totally enclosed chambers, separated from the Work Area and each other by airlocks, as follows:

(1) Washroom: An equipment washroom shall have two air locks (one separating the unit from the Work Area and one common air lock that separates it from the holding area). The washroom shall have facilities for washing material containers and equipment. Gross removal of dust and debris from contaminated material containers and equipment shall be accomplished in the Work Area, prior to moving to the washroom.

B. Holding Area: A holding area shall share a common air lock with the equipment washroom and shall have a curtained doorway to outside areas. A hinged, lockable door shall be placed at the holding area entrance to prevent unauthorized access into the Work Area.

C. Small Asbestos Project:

1. The worker decontamination enclosure system shall consist of, as a minimum, an equipment room, a shower room, and a clean room separated from each other and from the work area by curtained doorways. The equipment storage, personnel gross decontamination and removal of disposal clothing shall occur in the equipment room prior to entering the shower. All other requirements shall be the same as described above for a large asbestos project.

2. For small asbestos projects with only one exit from the work area, the shower room may be used as a waste washroom. The clean room shall not be used for waste storage. All other requirements shall be the same as described above for a large asbestos project.

D. Decontamination Enclosure System Utilities: Lighting, heat, and electricity shall be provided as necessary by the Asbestos abatement contractor, and as specified herein.

3.03 PERSONNEL ENTRANCE AND DECONTAMINATION PROCEDURES FOR REMOVAL OPERATIONS UTILIZING REMOTE DECONTAMINATION FACILITIES

A. All individuals who enter the Work Area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall fully identify the facility, agents, asbestos abatement contractor(s), the project, each Work Area, and worker respiratory protection employed. The asbestos handler supervisor shall be responsible for the maintenance of the log during the abatement activity. The log shall be submitted to the NYC DDC within 48 hours of request.

B. Each worker shall remove street clothes in the clean room; wear two disposable suits, including gloves, hoods and non-skid footwear; and put on a clean respirator (with new filters) before entering the Work Area.

C. Each worker shall, before leaving the Work Area or tent, clean the outside of the respirators and outer layer of protective clothing by wet cleaning and/or HEPA-vacuuming. The outer disposable suit shall be removed in the airlock prior to proceeding to the Worker Decontamination Unit. The inner disposable suit and respirator shall be wet wiped and HEPA vacuumed thoroughly before removing and prior to aggressive shower.

D. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately.

3.04 PERSONNEL ENTRANCE AND DECONTAMINATION PROCEDURES FOR REMOVAL OPERATIONS UTILIZING ATTACHED DECONTAMINATION FACILITIES

A. All workers and authorized visitors shall enter the Work Area through the worker decontamination facility.

B. All individuals who enter the Work Area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, asbestos abatement contractor(s), the

project, each Work Area and worker respiratory protection employed. The site supervisor shall be responsible for the maintenance of the log during the abatement activity. The log shall be submitted to the NYC DDC within 48 hours of request.

C. Each worker or authorized visitor shall, upon entering the job site, remove street clothes in the clean room and put on a clean respirator with filters, and clean protective clothing before entering the Work Area through the shower room and equipment room.

D. Each worker or authorized visitor shall, each time he leaves the Work Area, remove gross contamination from clothing before leaving the Work Area; proceed to the equipment room and remove clothing except the respirator; still wearing the respirator, proceed to the shower room; clean the outside of the respirator with soap and water while showering; remove filters, wet them, and dispose of them in the container provided for that purpose; wash and rinse the inside of the respirator; and thoroughly shampoo and wash himself/herself.

E. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately. Disposable clothing of the type worn inside the Work Area is not permitted outside the Work Area.

3.05 MAINTENANCE OF DECONTAMINATION ENCLOSURE FACILITIES AND BARRIERS

The following procedures shall be followed during abatement activities.

A. All polyethylene barriers inside the work place and partitions constructed to isolate the Work Area from occupied areas shall be inspected by the asbestos handler supervisor at least twice per shift.

B. Smoke tubes shall be used to test the integrity of the Work Area barriers and the decontamination enclosure systems daily before abatement activity begins and at the end of each shift.

C. Damage and defects in the decontamination enclosure system shall be repaired immediately upon discovery. The decontamination enclosure system shall be maintained in a clean and sanitary condition at all times.

D. At any time during the abatement activity, if visible emissions are observed, or elevated asbestos fiber counts outside the Work Area are measured, or if damage occurs to barriers, abatement shall stop. The source of the contamination shall be located, the integrity of the barriers shall be restored and extended to include the contaminated area, and visible residue shall be cleaned up using appropriate HEPA-vacuuming and wet cleaning.

E. Inspections and observations shall be documented in the daily project log by the asbestos handler supervisor.

F. The daily inspection to ensure that exits have been checked against exterior blockage or impediments to exiting shall be documented in the log book. If exits are found to be blocked, abatement activities shall stop until the blockage is cleared.

3.06 MODIFICATIONS TO HVAC SYSTEMS

A. Shut down, isolate or seal, all existing HVAC units, fans, exhaust fans, perimeter convection air units, supply and/or return air ducts, etc., situated in, traversing or servicing the work zone.

B. Seal all seams with duct tape. Wrap entire duct with a minimum of two layers of fire retardant 6-mil polyethylene sheeting. All shutdowns are to be coordinated with the Facility. Where systems must be maintained, i.e., traversing Work Areas to non-Work Areas, only supply ducts will be maintained, protect as described above. All returns must be blanked off in Work Area and adjacent areas, including floor above and below Work Area. When required Asbestos abatement contractor shall apply for a clarification from NYCDEP. The Asbestos abatement contractor shall implement the following engineering procedures:

1. Maintenance of a positive pressure within the HVAC system of 0.01 inch water gauge (or greater) with respect to the ambient pressure outside the Work Area. The conditions for this system shall be maintained and be operational 24 hours per day from the initiation of Work Area preparation until successful final air clearance. Positive pressurization of HVAC system shall be applied only under the direction and control of professional engineer, or other knowledgeable licensed professional;

2. The positive pressurization of the duct shall be tested, inspected and recorded both at the beginning and at the end of each shift;

3. The positive pressurization shall be monitored using instrumentation which will provide a written record of pressurization and that will trigger an audible alarm, if the static pressure falls below the set value;

4. The supply air fan and the supply air damper for the active positive-pressurized duct shall be placed in the manual “on” positions to prevent shutdown by fail-safe mechanisms;

5. The return air fan and the return air dampers shall be shut down and locked-out;

6. All the seams of the HVAC ducts that pass through the Work Area shall be sealed;

7. The HVAC ducts that pass through the Work Area shall be covered with two (2) layers of fire retardant 6-mil polyethylene sheeting, and all seams and edges of both layers shall be sealed airtight;

8. The supply air fans, return air fans, and all dampers servicing the Work Area itself shall be shut down and locked-out. All openings within the Work Area of supply and return air ducts shall be sealed with 3/8-inch fire rated plywood and two layers of fire retardant 6-mil polyethylene;

9. When abatement occurs during periods while the HVAC system is shut down an alternative method of pressurization of the duct passing through the Work Area should be employed (e.g., by low-pressure "blowers", etc., directly coupled into the duct). Item #4 above shall be deleted and shall be replaced by the requirement to set the dampers of the HVAC duct in the manual closed positions, in order to effect pressurization.

C. Asbestos abatement contractor to coordinate this item with the Facility and Construction Project Manager at the commencement of work. Where present HVAC systems (ducts) service an area and that air system cannot be shut down, asbestos abatement contractor shall isolate and seal the ducts, both supply and return, at the boundary of that zone.

1. To isolate, cap, or seal a duct, the asbestos abatement contractor shall remove insulation from duct (if necessary), then disconnect linkage to fold shut all fire dampers. Asbestos abatement contractor shall seal all edges and seams with caulk and duct-tape.

2. Asbestos abatement contractor shall then cut existing duct and fold metal in and secure with approved fasteners. Asbestos abatement contractor shall caulk and duct-tape all seams and edges.

3. All ducts shall then be completely wrapped and sealed with duct-tape and three (3) layers of reinforced polyethylene sheeting.

4. All ducts shall be restored to original working order at the end of the project.

D. Where present HVAC systems (ducts) service occupied areas (non-Work Areas), the Asbestos abatement contractor shall blank off the ducts.

1. To isolate or seal the return duct, the asbestos abatement contractor shall remove any insulation (if necessary) from the duct. Then disconnect linkage to fold shut all fire dampers and insert a fiberglass board within the duct. Asbestos abatement contractor shall seal all edges and seams with caulk, duct-tape and three (3) layers of reinforced polyethylene sheeting.

2. All isolation of return ducts and any other activity that requires removal of ceiling by the asbestos abatement contractor shall be conducted under controls. Work is to be coordinated with the Construction Project Manager and the Facility and is described as follows:

   a. Work shall occur as scheduled.

   b. Horizontal surfaces near the blanking operations shall be protected with fire retardant 6-mil polyethylene sheeting.

   c. Plastic drapes shall be used to enclose the immediate area.

   d. Asbestos abatement contractor to position and operate air filtration devices and HEPA-vacuums in the area to clean space after blanking operations.

   e. All personnel involved with this work shall receive personal protection (i.e., respirators and disposable suits).

E. Upon loss of negative pressure or electric power, all work activities in an area shall cease immediately and shall not resume until negative pressure and/or electric power has been fully restored. When a power failure or loss of negative pressure lasts, or is expected to last, longer than thirty (30) minutes, the following sequence of events shall occur.

   1. All make up air inlets shall be sealed airtight.

   2. All decontamination facilities shall be sealed airtight after evacuation of all personnel from the Work Area.

   3. All adjacent areas shall be monitored for potential fiber release upon discovery of and subsequently throughout, power failure.

3.07 LOCKOUT OF HVAC SYSTEMS, ELECTRIC POWER, AND ACTIVE BOILERS

Prior to the start of any prep work, the asbestos abatement contractor shall employ skilled tradesmen with limited asbestos licenses for the following work:

A. Disable all ventilating systems or other systems bringing air into or exhausting air out of the Work Area. Disable system by disconnecting wires removing circuit breakers, by lockable switch or other positive means to ensure against accidental re-starting of equipment.

B. Lock out power to the Work Area by switching off all breakers and removing them from panels or by switching and locking entire panel. Label panel with following notation: “DANGER CIRCUIT BEING WORKED ON”. Give all keys to Facility.

C. Lock out power to circuits running through Work Area whenever possible by switching off and removing breakers from panel. If circuits must remain live, the Facility shall notify asbestos abatement contractor in order that he may secure a variance from NYCDEP. The asbestos abatement contractor shall protect all conduit and wires to remain and label all active circuits at intervals not to exceed 3 feet with tags having the following notation: “DANGER LIVE ELECTROCUTION HAZARD”. The asbestos abatement contractor shall label all circuits in all locations including hidden locations that may be affected by the work in a similar manner.

D. All boilers and other equipment within the work area shall be shut down, locked out, tagged out and the burner/boiler/equipment accesses and openings shall be sealed until abatement activities are complete. If the boiler or other exhausted equipment will be subject to abatement, all breeching, stacks, columns, flues, shafts, and double-walled enclosures serving as exhausts or vents shall be segregated from the affected boiler or equipment and sealed airtight to eliminate potential chimney effects within the work area.

PART 4 – PREPARATION OF WORK AREA AND REMOVAL PROCEDURES

4.01 REMOVAL OF ASBESTOS-CONTAINING MATERIAL

A. Asbestos abatement contractor Responsibility

Asbestos abatement contractor shall be responsible for the proper removal of ACM from the Work Area using standard industry techniques. The Third-Party Air Monitor representative shall observe the Work.

1. General Requirements:

   a. Removal of ACM shall be performed using wet methods. Dry removal of ACM is prohibited.

   b. Spray ACM with amended water with sufficient frequency and quantity to enhance penetration. Sufficient time shall be allowed for amended water to penetrate the material to the substrate prior to removal. All ACM shall be thoroughly wetted while work is being conducted.

   c. Accumulation of standing water on the floor of the Work Area is prohibited.

d. Apply removal encapsulants, when used, in accordance with the manufacturer's recommendations and guidelines.

e. Containerize ACM immediately upon detachment from the substrate. Alternately, ACM may be dropped in to a flexible catch basin and promptly bagged. Detached ACM is not permitted to lie on the floor for any period of time. Excess air within the bag shall be removed before sealing. ACM shall not be dropped from a height of greater than 10 feet. Above 10 feet, dust free inclined chutes may be used. Maximum inclination from horizontal shall be 60-degrees for all chutes.

f. Exits from the work area shall be maintained, or alternative exits shall be established, in accordance with section 1027 of the New York City Fire Code. Exits shall be checked at the beginning and end of each work shift against blockage or impediments to exiting.

g. Signs clearly indicating the direction of exits shall be maintained and prominently displayed within the work area.

h. No smoking signs shall be maintained and prominently displayed within the work place.

i. At least one fire extinguisher with a minimum rating 2-A:10-B:C shall be required for each work place. In the case of large asbestos projects, at least two such fire extinguishers shall be required.

j. If the containment area of an asbestos project covers the entire floor of the affected building, or an area greater than 15,000 square feet on any given floor, the installation of a negative air cut off switch or switches shall be required at a single location outside the work place, such as inside a stairwell, or at a secured location in the ground floor lobby when conditions warrant. The required switch or switches shall be installed by a licensed electrician pursuant to a permit issued by the Department of Buildings. If negative pressure ventilation equipment is used on multiple floors the cut off switch shall be able to turn off the equipment on all floors.

B. Removal of ACM Utilizing Full Containment Procedures shall be as follows:

1. Preparation Procedures:

a. Ensure that the Third-Party Air Monitor has performed area monitoring and established a background count prior to the preparatory operations for each removal area, as applicable.

b. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the Work Area. Vents within the Work Area and seams in HVAC components shall be sealed with tape and two layers of fire-retardant polyethylene sheeting. Filters in HVAC systems shall be removed and treated as asbestos contaminated waste.

c. Shut down, disconnect, and lock out or tag all electric power to the Work Area so that there is no possibility of its reactivation until after clearance testing of the Work Area.

d. Provide and install decontamination enclosure systems in accordance with Sections 3.01 and 3.02 of this Section.

e. Remove ACM that may be disturbed by the erection of partitions using tent procedures and wet removal methods. Removal shall be limited to a one-foot wide strip running the length/height of the partition.

f. Pre-clean and remove moveable objects from the Work Area. Pre- cleaning shall be accomplished using HEPA-vacuum and wet- cleaning techniques. Store moveable objects at a location determined by the City.

g. Protect carpeting that will remain in the Work Area.

(1) Pre-clean carpeting utilizing wet-cleaning techniques.

(2) Install a minimum of two layers of fire retardant 6-mil reinforced polyethylene sheeting over carpeting.

(3) Place a rigid flooring material, minimum thickness of 3/8-inch, over polyethylene sheeting.

h. Pre-clean all fixed objects to remain within the Work Area using HEPA-vacuum and wet-cleaning techniques.

i. Seal fixed objects with two individual layers, minimum, of 6-mil fire retardant polyethylene sheeting.

j. Pre-clean entire Work Area utilizing HEPA-vacuum and wet-cleaning techniques. Methods of cleaning that raise dust; such as dry sweeping or use of vacuum equipment not equipped with HEPA-filters, is prohibited.

k. Install isolation barriers (i.e., sealing of all openings, including but not limited to windows, corridors, doorways, skylights, ducts, grills, diffusers, and other penetrations within the Work Area) using two layers of 6-mil fire retardant polyethylene sheeting and duct-tape.

l. Construct rigid framework to support Work Area barriers.

(1) Framework shall be constructed using 2-inch by 4-inch wooden or metal studs placed 16 inches on center when existing walls and/or ceiling do not exist for all openings greater than 32 square feet. Framework is not required except where one dimension is one foot or less or the opening will be used as an emergency exit.

(2) Apply a solid construction material, minimum thickness of 3/8- inch to the Work Area side of the framing. In secure interior areas, not subject to access from the public or building occupants, an additional layer of 6-mil fire retardant polyethylene sheeting may be substituted for the rigid construction material.

(3) Caulk all wall, floor, ceiling, and fixture joints to form a leak tight seal.

m. Seal floor drains, sumps, shower tubs, and other collection devices with two layers of 6-mil fire retardant plastic and fire rated plywood, as necessary, and provide a system to collect all water used by the asbestos abatement contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer.

n. Remove ceiling mounted objects not previously sealed that will interfere with removal operations. Mist object and surrounding ACM with amended water prior to removal to minimize fiber dispersal. Clean all moveable objects using HEPA-vacuum and wet-cleaning techniques prior to removal from the Work Area.

o. Fiberglass insulation with intact coverings shall be protected in place during abatement activities. These materials shall be protected with two layers of 6-mil fire retardant polyethylene sheeting as isolation barriers and two additional layers of 6-mil fire retardant polyethylene sheeting serving as primary and secondary surface barriers.

p. Install and initiate operation of Air Filtration Devices (AFD)s to provide a negative pressure and a minimum of four air changes per hour within the Work Area relative to surrounding non-Work Areas. Do not shut down AFDs until the Work Area is released to the City following final clearance procedures. The use of HEPA-filtered vacuum to produce a negative air pressure inside the enclosure is prohibited.

q. Maintain emergency and fire exits from the Work Area or establish alternative exits satisfactory to the local fire officials. Emergency exits and routes shall be established and clearly marked with florescent paint or other effective designations to permit easy location from anywhere within the Work Area. Cutting tools (e.g., knife, razor) shall be attached to the work area side of the sheeting for use in the event that the barrier must be cut open to allow egress. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting. Exits shall be checked daily against exterior blockage or impediments to exiting.

r. Temporary lighting within the Work Area and decontamination system shall be provided as required to achieve minimum illumination levels.

s. Hand power tools used to drill, cut into, or otherwise disturb ACM shall be manufacturer-equipped with HEPA filtered local exhaust ventilation.

t. Prior to being plasticized, the Work Areas shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall not be used.

u. Plasticize the area after pre-cleaning, using the following procedures.

(1) Cover floors with one layer of 6-mil fire retardant polyethylene sheeting, turning layer a minimum of 6 inches up wall, and seal layer to wall.

(2) Cover walls with one layer of 6-mil fire retardant polyethylene sheeting, overlapping wall layer a minimum of 6 inches, and seal layer to floor layer.

(3) Cover floors with a second layer of 6-mil fire retardant polyethylene sheeting, turning layer a minimum of 12 inches up wall, and seal layer to wall.

(4) Cover walls with a second layer of fire retardant 6-mil polyethylene sheeting, overlapping wall layer a minimum of 12 inches, and seal layer to floor layer.

(5) In areas where demolition is required to access ACM, a layer of fire retardant 6-mil reinforced polyethylene sheeting shall be placed on the floor of the enclosure.

(6) Perform demolition required to access ACM. Debris resulting from demolition activities shall be disposed of as ACM waste as described in this Specification.

(7) Repeat preparation of areas accessed by demolition activities as described above.

v. Suspended ceiling tiles and T-grid components shall remain in place until the preparation of the Work Area below the ceiling tiles are completed and personnel and equipment decontamination enclosures have been constructed.

w. Scaffolds shall be provided for workers engaged in work that cannot safely be performed from the ground or other solid Work Area surface.

x. Means of egress shall not be obstructed by hard wall barriers.

y. Pre-Removal Inspections.

(1) Prior to removal of any ACM, the asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.

(2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.

(3) Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.

2. Removal of ACM Within Full Containment:

   a. Mist material with amended water. Allow sufficient time for the amended water to penetrate the material to be removed.

   b. Remove the material using hand tools such as scrapers or putty knives. Wire-mesh or wood lathe reinforcing, when present, shall be cut into manageable pieces and disposed of as ACM.

   c. Remove any residual material from the substrate using wet cleaning methods and nylon-bristled hand brushes.

   d. Place the removal material immediately into a properly labeled fire retardant 6-mil polyethylene bag. All material shall be properly containerized and decontaminated prior to removal from the Work Area.

   e. Following the completion of removal of insulation, all visible residue shall be removed from the substrate.

3. Following Removal of ACM utilizing Full Containment Procedures:

   a. First Cleaning:

      (1) Remove any visible accumulation of asbestos material and debris. HEPA-vacuuming and wet cleaning shall be performed on all surfaces inside the Work Area. All sealed drums, plastic bags, and equipment used in the Work Area shall be removed from the Work Area.

      (2) Upon request of the asbestos abatement contractor, the Third- Party Air Monitor will perform a visual inspection. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.

      (3) Remove first layer of plastic sheathing inside the Work Area. The isolation barriers and decontamination facility shall remain in place and be utilized.

   b. Second Cleaning:

      (1) After the first cleaning, the Work Area shall be vacated for twelve hours to allow fibers to settle.

(2) All objects and surfaces in the Work Area shall be HEPA - vacuumed and wet cleaned for a second cleaning.

(3) A thin coat of lockdown encapsulant shall be applied to all plastic covered surfaces in the Work Area.

(4) When the encapsulant is dry, second layer of polyethylene sheeting on the walls, ceiling and floors shall be removed. Do not remove seals from doors, windows, Isolation Barriers or disconnect the negative pressure equipment.

c. Third Cleaning:

(1) A minimum of four hours after the second cleaning, all the surfaces in the Work Area shall be HEPA-vacuumed and wet cleaned for a third cleaning.

(2) Upon the request of the asbestos abatement contractor, the Third-Party Air Monitor will do final visual inspection for re- occupancy. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.

(3) When the Work Area passes the Third-Party Air Monitor's visual re-occupancy inspection, air sampling shall not begin until at least one hour after the completion of the third cleaning. The Third-Party Air Monitor shall perform air monitoring using aggressive testing techniques. The Third- Party Air Monitor will approve re-occupancy if the specified fiber count in the Work Area is achieved according to the Third-Party Air Monitor.

(4) When the Work Area passes the re-occupancy test, all controls and seals established shall be removed.

(5) The cleaned layer of the surface barriers shall be removed from walls and floors.

(6) The isolation barriers shall remain in place throughout cleanup. Decontamination enclosure systems shall remain in place and be utilized. A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but

excepting sprinklers, standpipes, and other active elements of the fire suppression system.

d. Final Barrier Removal:

(1) Upon receipt of acceptable clearance testing results, polyethylene sheeting and Isolation Barriers shall be removed and disposed accordingly as asbestos-containing material.

(2) The area surrounding the abatement workplace shall be cleaned of any visible debris utilizing HEPA vacuum and wet methods.

e. The Third-Party Air Monitor will conduct a final visual observation. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization.

C. Removal of ACM Roofing and Flashing Materials utilizing NYC DEP § 1-107 Foam Procedure for Roof Removal shall be as follows:

1. Preparation procedures:

a. These procedures apply only to the removal of asbestos-containing roofing material (ACRM) from exterior roof surfaces. The work area on the roof shall be cordoned off with clearly visible barriers such as caution tape, and only authorized persons shall have access.

b. The foam or viscous liquid shall be non-toxic, shall not require special respiratory protection for handling, and shall not affect the handling and disposal of the waste.

c. The foam or viscous liquid shall coat and maintain a stable blanket (minimum 1" thickness) for the duration of the removal process and shall leave an identifiable colored residue when it dissipates.

d. The foam or viscous liquid shall wet the ACRM. The ACRM shall be kept wet through the bagging process.

e. Persons entering the work area shall wear correctly-fitting, good traction rubber boots.

f. Abatement shall not be carried out during adverse weather conditions (e.g., precipitation, high winds, ambient temperature below 32 degrees Fahrenheit, etc.).

g. The worker decontamination unit may be attached to each work area at an entry/exit from each work area, or may be remote, in which case it shall be equipped with an airlock at the entrance. In addition to the shower head(s), the shower room shall be equipped with a flexible hose for waste decontamination for removal of less than 1,000 square feet of ACRM. For 1,000 square feet or more of ACRM removal, a separate waste decontamination facility shall be located at an entry/exit from each work area. Remote holding areas for the asbestos containing waste shall comply with Title 16, Chapter 8, Rules of the City of New York (16 RCNY 8 et. seq.).

h. Movable objects shall be removed from the work area, or kept in place and wrapped in one sheet of fire retardant 6 mil plastic sheeting.

i. Provisions shall be made to ensure a safe and adequate air supply to affected building(s). All vents, skylights, air intakes, windows and doors opening onto the roof, and all other openings shall be sealed with 2 layers of fire retardant 6 mil plastic or fitting with HEPA filters when appropriate. Temporary extensions may be installed to a height of 10 feet to ensure adequate air exchange instead of sealing vents, air intakes, etc., with 2 layers of plastic or HEPA filters. Drains may be equipped with 5 micron filtering system in lieu of being sealed.

j. Fixed objects including perimeter walls, bulkheads, cooling towers, ducts and other rooftop appurtenances shall be covered in one sheet of fire retardant 6 mil plastic up to a height of at least six feet.

k. The asbestos abatement contractor shall be responsible for protection of the interior spaces beneath the roof.

l. All office equipment and furniture, including but not limited to desks, chairs, computers, printers, cabinets, etc., carpeted and wooden floors shall be covered with one layer of 6- mil plastic sheeting.

m. The asbestos abatement contractor shall be responsible for any damage that may occur in the interior spaces, including but not limited to office equipment, furniture, floors, etc., beneath the roof during all phases of the roof abatement.

n. The asbestos abatement contractor shall provide temporary roof protection consisting of 10-mil polyethylene sheeting following abatement over the open roof areas. Strict coordination with the General Asbestos abatement contractor, Construction Project Manager and/or Architect is required and necessary during this phase of abatement.

o. Preliminary examination shall be conducted and precautions shall be taken to prevent damage to the interior of the building, including but not limited to office equipment, furniture, carpeted and wooden floors, etc., and to ensure no adverse effect on the structural stability of the roof due to the abatement activity.

p. Abatement activities shall not be carried out during adverse weather conditions (e.g., precipitation, heavy winds, etc.).

q. The floor area between the remote decontamination facility and the Work Area must be protected with 2 layers of 6-mil. polyethylene sheeting suitably anchored.

r. Provisions shall be made to ensure a safe and adequate air supply to affected building(s). All vents, skylights, air intakes, windows and doors opening onto the roof, and all other openings are to be sealed with two layers of 6-mil plastic or fitted with HEPA-filters where appropriate. In lieu of sealing vents, air intakes, etc., with two layers of plastic or HEPA-filters, temporary extensions may be installed to a height of 10 feet to ensure adequate air exchange. Drains may be equipped with 5 micron filtering systems in lieu of being sealed.

s. Pre-Removal Inspections:

(1) Prior to removal of any ACM, the Asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.

(2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.

(3) Following the Third-Party Air Monitor’s approval of the Work Area preparations, removal of ACM may commence.

2. Removal of ACM Roofing and Flashing Materials:

   a. The asbestos abatement contractor shall be responsible for the removal of all roofing components, including multiple layers of built-up membrane, tar, vapor barrier and/or flashing down to the substrate/deck.

   b. Prior to actual removal, the built-up roofing shall be blanketed and wetted with a minimum 1" coating of the acceptable foam or viscous liquid which shall be maintained for the duration of the removal until the material is bagged. The foam or viscous liquid shall be confined to the work area.

   c. Hand-held power tools used to drill, cut into, or otherwise disturb the ACRM shall be equipped with the HEPA-filtered local exhaust ventilation and operated to prevent potential fiber release.

   d. Abatement shall not be performed in adverse weather conditions (e.g., precipitation, heavy winds, etc.). Asbestos abatement contractor shall protect all exposed roof during adverse weather conditions.

   e. Portable HEPA-vacuum machines shall be available during abatement.

   f. After the ACM removal and bagging, the bagged waste shall be HEPA-vacuumed, and then wet-cleaned and transferred into the shower room for double bagging. The double-bagged waste shall be transferred outside the clean room for its final transfer for storage in an enclosed waste container.

3. Following Removal of ACM Roofing and/or Flashing:

   a. Upon completion of the abatement in roof work area, clean-up procedures shall involve removal and bagging of:

   b. The asbestos containing roofing material (ACRM)

   c. Visible accumulations of asbestos containing waste

   d. All excess foam or similar viscous liquid

   e. All debris, and shall be followed by a thorough wet cleaning.

   f. All tools shall be wet cleaned and HEPA-vacuumed, and then removed from the work area upon completion.

g. Following the removal of all debris, the work area shall be thoroughly wet cleaned. The work area shall be allowed to dry completely before the visual inspection is conducted. The inspection shall confirm the absence in the work area of:

(1) ACM, debris, bagged ACM waste,

(2) Excess foam or other viscous liquid.

h. If the work area fails visual inspection, it shall undergo another wet cleaning and/or HEPA vacuuming until it passes the visual inspection.

i. When the visual inspection and clearance testing is successful, all plastic may be removed.

j. Air monitoring shall be conducted in accordance with the relevant provisions of Air sampling shall be conducted in compliance with NYC DEP Title 15 Chapter 1, §1-41 Air Sampling Schedule.

D. Removal of ACM from Vertical Exterior Surfaces utilizing NYCDEP Title 15, Chapter 1 §1-109 Abatement from Vertical Exterior Surfaces procedures shall be as follows:

Preparation procedures: This procedure shall apply to the abatement of asbestos-containing materials from vertical exterior surfaces such as, but not limited to caulking or glazing compounds, asphaltic materials or tar, cement siding or shingles (including transite), paints, sealants coping stone caps or clay roof tiles.

a. The entire surface to be abated and ground-level perimeter shall be considered the work area unless partitions and warning tape are used to define the work area.

b. A restricted area shall be established using warning tape extending at least 25 feet from the affected areas of the building or to the nearest vertical obstruction or the curb.

c. The restricted area may be entered only by certified workers or authorized visitors.

d. Before plasticizing, the restricted area shall be inspected for ACM debris and, if necessary, pre-cleaned using HEPA vacuums and wet methods.

e. All openings to the building or structure's interior which are within 25 feet of the affected ACM shall be closed and sealed.

f. Scaffolding erected to access the ACM shall be constructed, maintained, and used in accordance with applicable federal, state, and city laws.

g. Horizontal surfaces beneath the affected ACM shall be covered with two layers of fire-retardant 6-mil plastic to a width of six feet.

h. Elevated platforms being used to access the affected ACM shall be plasticized with two layers of fire-retardant 6-mil plastic, which shall extend up from the platform to at least the height of the mid-rail on three sides and shall be attached directly to the building just below the surfaces under abatement.

i. The ground-level restricted area shall be cleared of all moveable objects and plasticized with two sheets of fire-retardant 6-mil plastic, which shall be extended one foot up the side of the building. The plasticized area shall be ten feet wide for every floor up to a maximum width of thirty feet, or to the curb. This plastic shall be cleaned, replaced, and disposed of as asbestos waste at the end of each shift.

j. Sidewalk bridges in the restricted area shall be covered with two layers of fire retardant 6-mil plastic, placed over and secured to the bridge, spread across the full width, draped over the side to ground level, and extended to a width of at least thirty feet.

k. Establish a remote decontamination unit in accordance with Section 3.01 within the restricted area.

l. Construct all elevated work platforms a minimum of one foot below the surface to be abated.

m. Pre-Removal Inspections

(1) Prior to removal of any ACM, the asbestos abatement contractor shall notify the Project Monitor and request a pre- removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.

(2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.

(3) Following the Project Monitor's approval of the Work Area preparations, removal of ACM may commence.

2. Removal of ACM Materials:

a. Mist material with amended water. Allow sufficient time for the amended water to penetrate the material to be removed.

b. Remove the caulk using hand tools such as knives or scrapers.

c. Exercise caution when removing caulking material to prevent damage to windows or skylight openings.

d. Remove any residual asbestos-containing caulking material from the substrate using wet cleaning methods and nylon-bristled hand brushes. The use of metal bristled brushes is prohibited.

e. Place the removed material immediately into a properly labeled 6-mil polyethylene bag. All material shall be properly containerized and decontaminated prior to removal from the Work Area.

f. Following the completion of removal of caulking, all visible residues shall be removed from the substrate.

g. Air sampling shall be conducted in compliance with NYC DEP Title 15 Chapter 1, §1-41 Air Sampling Schedule. This sampling shall be performed by the Third-Party Air Monitoring Firm.

3. Following Removal of ACM:

a. The stripped substrate shall be HEPA vacuumed and wet-wiped.

b. A visual clearance inspection shall be conducted by the asbestos handler supervisor and project monitor after the work area dries, to ensure the absence of ACM residue or debris in the work area.

c. After the inspection is completed, the warning tapes and barriers may be removed.

d. The clearance inspection shall be documented in the log and the project air sampling log.

e. Air monitoring shall be conducted in accordance with relevant provisions.

f. Asbestos abatement contractor shall request and pass a visual inspection performed by the consultant before proceeding to the next step. Documentation of passing this inspection shall be recorded in a daily logbook.

g. The Third-Party Air Monitor will conduct a visual observation of the Work Area to verify the absence of asbestos-containing waste materials.

h. If the Work is accepted by the Third-Party Air Monitor based on the inspection, asbestos abatement contractor shall be notified. Conduct the following activities in accordance with the contract and all applicable laws, codes, rules and regulations:

(1) All waste shall be removed from the Work Area and holding areas.

(2) All tools and equipment are to be removed and decontaminated in the decontamination enclosure system.

i. If the Work is not approved, the Third-Party Air Monitor will inform Asbestos abatement contractor who will then HEPA-vacuum and/or wet-clean the Work Area. The Third-Party Air Monitor will then perform a subsequent visual observation. This process will continue until the Third-Party Air Monitor accepts the Work Area as clean.

j. Final Barrier Removal

(1) Upon receipt of acceptable observation results, polyethylene sheeting and barrier tape shall be removed and disposed accordingly as ACM.

(2) The area surrounding the abatement workplace shall be cleaned of any visible debris utilizing HEPA vacuum and wet methods.

(3) The Third-Party Air Monitor will conduct final visual inspection. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization. Other Information: Extra time required to clean Work Areas in order to achieve clearance criteria shall not be considered grounds for an extension of time for contract completion.

4.02 MAINTENANCE OF CONTAINED WORK AREA AND DECONTAMINATION ENCLOSURE SYSTEMS

A. Ensure that barriers are installed in a manner appropriate to the expected weather conditions during the project and for its duration. Repair damaged barriers and remedy defects immediately upon their discovery. Visually inspect barriers at the beginning and end of each work period.

B. Visually inspect non-Work Areas and the decontamination enclosure system for water leakage. Check the floor below, ceiling and walls, and view beneath/or around the decontamination enclosure system, for signs of leakage. Perform the visual inspection a minimum of two times for each 8-hour work shift.

PART 5 – ASBESTOS WASTE MANAGEMENT

5.01 ACM WASTE REQUIREMENTS

A. The asbestos abatement contractor and all sub-asbestos abatement contractors are specifically alerted to the illegal practice of combining asbestos-containing waste (ACW) from one project with the ACW of other projects without using the services of a permitted waste transfer station as defined by 6 NYCRR Part 360 and 364. As part of the shop drawing submittals, the asbestos abatement contractor must submit for approval the proposed method of transportation and disposal that will be utilized to manage the ACW of this Contract. If a permitted transfer station is to be used, the cost shall be included in the work. The asbestos abatement contractor must submit a waste manifest consistent with whatever approved method is utilized as part of the invoicing and payment procedures.

B. The asbestos abatement contractor shall maintain compliance with the strictest set of regulations of Title 15, Chapter 1 of RCNY, NYC LL 70/85, NYS DOL ICR 56, USEPA, Asbestos Regulation 40 CFR Section 61.152, 29 CFR 1926.1101, 29 CFR 1910.1200 (F) of OSHA's Hazard Communication Standards, and other applicable standards.

NOTE: Any penalties incurred for failure to comply with any of the above regulations will be the sole responsibility for fines imposed due to negligence of the Asbestos abatement contractor.

C. When presenting ACW for storage at the generation site, the asbestos abatement contractor shall:

1. Wet down ACW in a manner sufficient to prevent all visible emissions of dust into the air.

2. Seal material in a leak tight container while wet.

3. Keep ACW separate from any other waste.

D. When presenting ACW for storage away from the site of generation, the Asbestos abatement contractor shall:

1. Ensure that ACW has been properly packaged as per requirements above.

2. Examine the containers of ACW to ensure that there are no breaks in the containers and that no visible dust is being released into the air.

3. If examination reveals damage to a container of ACW the Asbestos abatement contractor or person accepting the waste shall immediately wet down the ACW and repackage it into a clean leak tight container. The subsequent repackaging shall be the financial responsibility of the Asbestos abatement contractor and occur at no extra cost to the City.

4. Keep ACW separate from any other waste.

E. When storing ACW – The Asbestos abatement contractor shall:

1. Ensure that the ACW has been sufficiently wetted down in tight containers.

2. Re-wet and repackage any damaged containers.

3. Maintain at storage site an adequate supply of spare leak tight containers.

4. Maintain at storage site an adequate supply of amended water.

5. Keep ACW separate from any other waste.

6. Keep ACW in a secured, enclosed, and locked container.

7. If the asbestos abatement contractor has intention of sorting a quantity of ACW greater than or equal to 50 cubic yards, the Asbestos abatement contractor shall:

a. Submit a written request and receive written approval from the City.

F. When presenting for transport, the asbestos abatement contractor shall:

1. Ensure that ACW has been sufficiently wetted down.

2. Examine the integrity of the container's airtight seal.

3. Re-wet and repackage any damaged containers.

4. Keep ACW separate from all other waste.

5. Ensure that a person transporting asbestos waste holds a valid permit issued pursuant to law.

6. Frequency of Waste Removal:

a. Properly packaged and labeled asbestos waste shall be removed from the site on a daily basis. Under no circumstance shall asbestos waste be stored on site without written approval from the City. The Waste Hauler and landfill shall be as indicated on the notifications to regulatory agencies.

G. Waste Load-out Through Equipment Decontamination Enclosure (Full Decontamination Facility): Place asbestos waste in disposal bags. Large items not able to fit into disposal bags shall be wrapped in one layer of 6-mil thick polyethylene sheeting. Clean outer covering of asbestos waste package by wet cleaning and/or HEPA-vacuuming in a designated part of the Work Area. Move wrapped asbestos waste to the equipment washroom, wet clean each bag or object and place it inside a second disposal bag, or a second layer of 6-mil polyethylene sheeting, as the item's physical characteristics demand. Air volume shall be minimized, and the bags or sheeting shall be sealed airtight with tape.

1. The clean containerized items shall be moved to the equipment decontamination enclosure holding area pending load-out to storage or disposal facilities.

2. Workers who have entered the equipment decontamination enclosure system from the uncontaminated non-Work Area shall perform load-out of containers from the decontamination enclosure holding area. Dress workers moving asbestos waste to storage or disposal facilities in clean overalls of a color different than from that of coveralls used in the Work Area. Ensure that workers do not enter from uncontaminated areas into the equipment washroom or the Work Area. Ensure that contaminated workers do not exit the Work Area through the equipment decontamination enclosure system.

3. Thoroughly clean the equipment decontamination enclosure system immediately upon completion of the waste load-out activities, and at the completion of each work shift.

4. Labeled ACM waste containers or bags shall not be used for non-ACM debris or trash. Any materials placed in labeled containers or bags, including those turned “inside-out”, shall be handled and disposed of as ACM waste.

H. All asbestos materials, wastes, shower water, polyethylene, disposable equipment and supplies shall be disposed of as asbestos contaminated waste, in accordance with the EPA regulation (40 CFR, Section 61.150) and those requirements of the New York Department of Environmental Conservation and New York City Department of Sanitation.

I. All asbestos materials shall be prepared for transportation in accordance with this specification and all applicable Federal, State, County and City Regulations. asbestos abatement contractor shall submit the following documentation:

1. Where applicable, an EPA Generator's identification number which has been obtained from the EPA for all asbestos waste generated from the project.

2. Applicable State Waste Hauler license and registration numbers.

3. Federal Hazardous Materials Waste Hauler number.

4. Designated landfill EPA Permit numbers.

J. Prior to loading asbestos waste the enclosed cargo areas (dumpster) shall be prepared as follows:

1. Clean via HEPA-vacuum and wet wipe techniques the enclosed cargo areas of all visible debris prior to preparing with polyethylene.

2. Line the cargo area with two layers of 6-mil polyethylene sheeting to prevent contamination from damaged or leaking containers. Floor sheeting shall be installed first and extend up the walls a minimum of 24-inches. Wall sheeting shall be overlapped and taped securely into place.

K. Asbestos-containing waste shall be placed on level surfaces in the cargo area of the dumpster and shall be packed tightly to prevent any shifting or tipping of the waste during transportation.

L. Asbestos-containing waste shall not be thrown into or dropped from the dumpster. All material shall be handled carefully to prevent rupture of the containers.

M. All personnel engaged in handling and loading of asbestos contaminated waste outside of the Work Area shall wear protective clothing. The disposable clothing shall include head, body and foot protection and color of clothing shall be different from abatement personnel in the Work Area. Minimum respiratory protection shall be half face, dual cartridge, air purifying respirators with HEPA-filters.

N. Asbestos abatement contractor shall immediately clean debris or residue observed on containers or surfaces outside of the Work Area. Cleaning shall be via HEPA equipped wet/dry vacuums only.

O. All asbestos-containing waste shall be transported from the abatement site to the landfill by a registered Waste Hauler. When transporting ACW:

1. Ensure that the ACW has been sufficiently wetted down in a leak tight container.

2. Re-wet and repackage any damaged containers.

3. Maintain at storage site an adequate supply of spare leak tight containers.

4. Maintain at storage site an adequate supply of amended water.

5. Keep ACW separate from any other waste.

P. Keep ACW in a secured, enclosed, and locked container.

Q. Waste transport documents shall conform to the requirements of the U.S. Department of Transportation, Hazardous Materials Transportation Regulation, 49 CFR Part 173 and EPA 40 CFR 61.150 (d)(1)(2). Shipping documents shall be clearly marked with the required designation "RQ Asbestos". Asbestos abatement contractor shall provide a copy of this document to the City.

R. A uniform hazardous waste manifest shall be prepared by the asbestos abatement contractor and signed by the asbestos abatement contractor each time the asbestos abatement contractor ships a dumpster load of Asbestos-Containing Waste Material. The uniform hazardous waste manifest shall include the site of waste generation, the names and addresses of the Transporter, the asbestos abatement contractor, and the landfill operator with information on the type and number of asbestos-waste containers, time and date. Asbestos abatement contractor shall provide the Construction Project Manager, Third-Party Air Monitor or authorized designated representative with signed copies of the waste manifest before each departure.

S. Asbestos abatement contractor or his/her Waste Hauler shall transport asbestos-containing waste material from the abatement site directly to the specified disposal site. Asbestos abatement contractor or their Waste Hauler shall not accept material

from any other site when transporting asbestos-containing waste material from the abatement site. The authorized DDC representative or Construction Project Manager reserves the right to travel with asbestos abatement contractor's Waste Hauler to the waste disposal site. No intermediate storage of waste material (i.e., asbestos abatement contractor's warehouse) shall be permitted.

T. Final or progress application for payments will not be processed unless all hazardous waste manifests generated to date have been received and reviewed by the Construction Project Manager.

U. All asbestos materials, wastes, shower water, polyethylene disposable equipment and supplies shall be disposed of as asbestos contaminated waste, in accordance with the EPA regulation (40 CFR, Section 61.150) and those requirements of the New York State Department of Environmental Conservation and the New York Department of Sanitation.

V. Asbestos abatement contractor shall transport all sealed drums to a landfill disposal site approved by the Department of Environmental Conservation and the EPA. Transportation shall be performed by a New York State registered Waste Hauler, where required. When presenting the ACW for disposal the Asbestos abatement contractor or sub Asbestos abatement contractor shall:

1. Ensure that waste container is properly labeled according to the National Emission Standard for Hazardous Air Pollutants (NESHAP); Asbestos Revision, 40 CFR, Part 61, Subpart M. The labels shall include the name of the waste generator and the location where the waste was generated.

2. Comply with all applicable orders issued pursuant to asbestos disposal.

3. Ensure that ACW has been sufficiently wetted down.

4. Re-wet and repackage any damaged containers.

5. Keep ACW separate from all other wastes.

W. Asbestos abatement contractor shall notify the waste disposal site, at least 24 hours prior to transportation of asbestos contaminated waste to be delivered. Asbestos abatement contractor shall determine if a larger notification period is required.

X. At the site asbestos abatement contractors or Waste Hauler trucks shall approach the dump location as close as possible for unloading asbestos waste. Containers shall be carefully placed in the ground. Do not throw containers from truck.

Y. Asbestos abatement contractor or Waste Hauler shall inspect containers as they are unloaded at the disposal site. Material in damaged containers shall be repacked in empty containers, as necessary.

Z. Asbestos abatement contractor or Waste Hauler shall not remove asbestos-containing waste Material from drums unless required to do so by the disposal site City. Used drums shall be disposed of as asbestos-asbestos contaminated waste.

AA. All personnel engaged in unloading of the containers at the waste site shall wear protective clothing. The disposable clothing shall include head, body and foot protection. Minimum respiratory protection shall be half face, dual cartridge, air purifying respirators with HEPA-filters. Workers shall remove their protective clothing at the disposal site, place it in labeled disposal bags and leave them with the deposited waste shipment.

BB. For the compaction operation, the asbestos abatement contractor shall ensure that disposal sites personnel have been provided with personal protective equipment by the disposal operator. If the disposal site City has not provided this protective equipment, the asbestos abatement contractor shall supply protective clothing and respiratory protection for the duration of this operation (PAPR respirators are mandatory).

CC. If containers are broken or damaged, the asbestos abatement contractor or Waste Hauler shall, using personnel who are properly trained and wearing proper protective equipment, shall repackage the waste in properly labeled containers. Asbestos abatement contractor shall then clean the entire truck and its contents using HEPA-vacuums and wet cleaning techniques until no visible residue is observed.

DD. Following the removal of all containerized waste, the asbestos abatement contractor shall decontaminate the truck cargo area using HEPA-vacuums and/or wet cleaning techniques until no residue is observed. All 6-mil polyethylene sheeting shall be removed and discarded as asbestos-containing waste material along with contaminated cleaning material and protective clothing, in containers at the disposal site.

EE. The transporter(s) of all asbestos waste shall not back-haul any items on his return from landfill/disposal site.

FF. All asbestos waste shall be disposed of in an approved Asbestos Landfill site only.

1. NO PERSON UNDER ANY CIRCUMSTANCES SHALL ABANDON ACW. The same shall be disposed of only by certified persons in approved landfills.

2. A manifest form will be signed by the Landfill documenting receipt and acceptance of the asbestos-containing waste. This manifest will be furnished to the City of New York within thirty calendar days from the project completion date.

3. It is the responsibility of the Asbestos abatement contractor to determine current waste handling, transportation and disposal regulations for the work site and for each waste disposal landfill. The Asbestos abatement contractor must comply fully with these regulations and all appropriate U.S. Department of Transportation, EPA and other Federal, State and Local entities' regulations and all other current legal requirements.

4. The asbestos abatement contractor shall obtain an agreement from the transporter (s) that the practice of "Back-Hauling" will not be engaged in, with respect to any and all waste loads taken from this site during the work.

5. The asbestos abatement contractor will document actual disposal of the waste at the designated landfill by having completed a Disposal Certificate and will provide a copy of the same to the Department of Design and Construction.

PART 6 – ACCEPTANCE

6.01 ACCEPTANCE

Upon satisfactory completion of all decontamination procedures, a certificate will be issued by the Construction Project Manager with copies to all parties.

A. A letter of Compliance stating that all the work on the project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations.

B. All warranties as stated in the Specifications.

END OF SECTION 02 82 13

SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Type III Environmental Product Declaration (EPD): For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Manufacturer Inventory: For each product, provide manufacturer's manifest of ingredients.

C. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. For insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

D. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Commissioner.

E. Engineering Services Submittal: For structural thermal break insulated connection system, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York, responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For engineer providing engineering services.

B. Engineering Services Engineer Qualifications: Include the following:

1. Experience providing engineering services of the type indicated.
2. Documentation that engineer is licensed in the State of New York.

C. Welding certificates.

D. Material Certificates: For each of the following, signed by manufacturers:

1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

E. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

2. Mechanical splice couplers.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. and to avoid damaging coatings on steel reinforcement.

1. Store reinforcement to avoid contact with earth.

2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
3. Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
4. Do not allow stainless steel reinforcement to come into contact with uncoated reinforcement.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, to design structural thermal break insulated connection system, including attachment to building construction.

B. Structural Performance of Insulating Connection System: Structural thermal break insulated connection system to withstand the following loads and stresses:

1. Dead Loads: As indicated on Drawings.

   a. Shear Load: As indicated on Drawings.
   b. Bending Moment: As indicated on Drawings.

2. Live Loads: As indicated on Drawings.

   a. Shear Load: As indicated on Drawings.
   b. Bending Moment: As indicated on Drawings.

2.2 STEEL REINFORCEMENT

A. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.

B. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

D. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

2.4 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.3 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.
3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

G. Install structural thermal break insulated connection system in accordance with manufacturer's instructions.

H. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

I. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

J. Dual-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

K. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material in accordance with ASTM A780/A780M.

3.4 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Commissioner.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.5 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will perform all Special Inspections under a separate contract.

1. Steel-reinforcement placement.
2. Steel-reinforcement mechanical splice couplers.
3. Steel-reinforcement welding.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.

c. Semirigid joint fillers.
d. Vapor-retarder installation.
e. Anchor rod and anchorage device installation tolerances.
f. Cold and hot weather concreting procedures.
g. Concrete finishes and finishing.
h. Curing procedures.
i. Forms and form-removal limitations.
j. Shoring and reshoring procedures.
k. Methods for achieving specified floor and slab flatness and levelness.
l. Floor and slab flatness and levelness measurements.
m. Concrete repair procedures.
n. Concrete protection.
o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
p. Protection of field cured field test cylinders.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Silica fume.
5. Aggregates.
6. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
7. Fiber reinforcement.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For , indicating compliance with requirements for low-emitting materials.

C. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.

7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

    a. Location of construction joints is subject to approval of the Commissioner.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Silica fume.

5. Aggregates.
6. Admixtures:

    a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Preconstruction Test Reports: For each mix design.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

C. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.9 PRECONSTRUCTION TESTING

A. TR3 (Technical Report for Concrete Design Mix): Contractor shall be responsible for, and bear all costs associated with the filing and securing of approvals, if any, for Form TR3: Technical Report Concrete Design Mix, including, but not limited to, engaging the services of a New York City licensed Concrete Testing Lab for the review and approval of concrete design mix, testing, signatures and professional seals, etc., compliant with NYC Department of Buildings requirements, for each concrete design mix.

1. Include the following information in each technical report:

    a. Admixture dosage rates.
    b. Slump.
    c. Air content.
    d. Seven-day compressive strength.
    e. 28-day compressive strength.
    f. Permeability.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.11 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I Type II Type I/II, .
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Silica Fume: ASTM C1240 amorphous silica.

C. Normal-Weight Aggregates: ASTM C33/C33M, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.

D. Lightweight Aggregate: ASTM C330/C330M, nominal maximum aggregate size.

E. Air-Entraining Admixture: ASTM C260/C260M.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.

G. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

2.3 FIBER REINFORCEMENT

A. Synthetic Macro-Fiber: Synthetic macro-fibers engineered and designed for use in concrete, complying with ASTM C1116/C1116M, Type III, 1 to 2-1/4 inches long.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Euclid Chemical Company (The); an RPM company.
b. GCP Applied Technologies Inc.
c. Sika Corporation.
d. Or approved equal.

2.4 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing admixture in pumped concrete, .

3. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.5 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 F0 S0 W0 C0.
2. Minimum Compressive Strength: 5000 psi at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

B. Class B: Normal-weight concrete used for foundation walls.

1. Exposure Class: ACI 318 F0 S0 W1 C1.
2. Minimum Compressive Strength: 5000 psi at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:

    a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.

C. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 F0 S0 W0 C0.
2. Minimum Compressive Strength: 5000 psi at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:

    a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

6. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 4.0 lb/cu. yd..

D. Class D: Normal-weight concrete used for interior suspended slabs.

1. Exposure Class: ACI 318 F0 S0 W0 C0.
2. Minimum Compressive Strength: As indicated at 28 days.
3. Maximum w/cm: 0.40.

4. Slump Limit: 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:

    a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

6. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 4.0 lb/cu. yd.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Commissioner.
2. Place joints perpendicular to main reinforcement.

    a. Continue reinforcement across construction joints unless otherwise indicated.
    b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls 8". Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Commissioner as well as testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Commissioner in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.

d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

a. Perform no later than one day after form removal.
b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
d. Maintain required patterns or variances as shown on Drawings or to match adjacent.

2. Grout-Cleaned Rubbed Finish:

a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
b. Do not clean concrete surfaces as Work progresses.
c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
d. Wet concrete surfaces.
e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.
f. Maintain required patterns or variances as shown on Drawings or to match design reference sample.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish orto be covered with fluid-applied or sheet waterproofing, or built-up or membrane roofing.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

    a. Slabs on Ground:

        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
        2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.

    b. Suspended Slabs:

1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.

c. Slab on Metal Deck:

1) Slabs on metal deck shall be poured to constant thickness regardless of surveyed top of steel elevation prior to concrete placement except as necessary to achieve required slopes to floor drains. Thereafter, the floor shall be brought to flatness and levelness tolerance through placement of self-leveling compounds.
2) Assume 3/4" of uniform self-leveling shall be required for all slab on metal deck floor slabs for the base contract requirement.
3) Specified overall values of flataness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Commissioner before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Commissioner before application.

G. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 150 lb/100 sq. ft. unless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating.
3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
4. After final floating, apply a trowel finish.
5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 5000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

3.10 TOLERANCES

A. Conform to ACI 117.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month.
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE CORRECTIVE WORK

A. Defective Concrete:

1. Repair and patch defective areas when approved by Commissioner.
2. Remove and replace concrete that cannot be repaired and patched to Commissioner's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.

   a. Limit cut depth to 3/4 inch.
   b. Make edges of cuts perpendicular to concrete surface.
   c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
   d. Fill and compact with patching mortar before bonding agent has dried.
   e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

   a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
   b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Commissioner.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

   a. Correct low and high areas.
   b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.

4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

    a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

    a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

    a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
    b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

    a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
    b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
    c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
    d. Place, compact, and finish to blend with adjacent finished concrete.
    e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

    a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    b. Dampen cleaned concrete surfaces and apply bonding agent.
    c. Place patching mortar before bonding agent has dried.
    d. Compact patching mortar and finish to match adjacent concrete.
    e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Commissioner's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Commissioner's approval.

3.13 FIELD QUALITY CONTROL

A. Special Inspections: City of New York performs all Special Inspections under a separate contract.

B. Tests and Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Commissioner.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 50 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.

4. Air Content:ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for structural lightweight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

    a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:

a. Cast and laboratory cure two sets of four 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
b. Cast, initial cure, and field cure two sets of four standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
b. Test one set of three field-cured specimens at seven days and one set of two specimens at 28 days.
c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Commissioner but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Commissioner.
b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Commissioner.

1) Acceptance criteria for concrete strength to be in accordance with ACI 301 Section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of floor finishing and promptly report test results to Commissioner.

3.14 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Lintels including structural thermal break material.
3. Brick including special shapes.
4. Mortar and grout materials.
5. Reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Accessories.
9. Mortar and grout mixes.

B. Related Requirements:

1. Section 042113.23 "Surface-bonded Brick Masonry" for thin brick assembly.
2. Section 044200 "Exterior Stone Cladding" for stone base secured with stone anchors.
3. Section 055000 "Metal Fabrications."
4. Section 072010 "Wall Framing Support System for Continuous Insulation" for brick veneer wall Z-furring.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R. Indicate elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
4. Shelf (Relieving) angles and lintels including structural thermal break material.

C. Engineering Services Submittal: For items indicated in paragraph 2.2A, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

D. Samples for Initial Selection:

1. Glazed brick.
2. Colored mortar.
3. Weep/cavity vents.

E. Samples for Verification: For each type and color of the following:

1. Special brick shapes.
2. Glazed brick.
3. Structural thermal break material.
4. Colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
5. Weep/cavity vents.
6. Cavity drainage material.
7. Accessories embedded in masonry.

F. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product unless otherwise indicated..
2. Type III Environmental Product Declaration (EPD): For each product unless otherwise indicated.

1.7 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence in accordance with ASTM C67/C67M.
d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing in accordance with ASTM C67/C67M.

2. Cementitious materials. Include name of manufacturer, brand name, and type.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installers Qualifications:

1. Installer must be an entity meeting requirements of DDC General Conditions Section 014000 article 1.7.C.1.
2. Provide full-time supervisor/foreman with experience on projects of similar type and scope, on-site while the work is in progress.

1.9 MOCKUPS

A. Sample Panel Mockups: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects.

1. Build sample panels for typical exterior and interior wallin sizes approximately 72 inches long by 48 inches high by full thickness.

a. Exterior wall:

1) Include a sealant-filled joint at least 16 inches (406 mm) long.
2) Include lower corner of window opening at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.

3) Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
4) Include metal studs, sheathing, sheathing joint-and-penetration treatment, air barrier, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.

b. Interior wall:

1) Include full depth / custom bullnose artwork.
2) Include metal studs and sheathing

2. Clean exposed faces of panels with masonry cleaner indicated.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Commissioner in writing.

a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Commissioner specifically approves such deviations in writing.

5. Demolish and remove mockup prior to Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.11 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the state of New York, to design masonry anchors, ties, and relieving angles, brackets, size, spacing, type, and size of relieving angle bracket connection to structure.

B. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry by testing masonry prisms in accordance with ASTM C1314.

2.2 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 ft. vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, use the equivalent thickness method for masonry units in accordance with ACI 216.1 units are listed by UL.

2.3 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units as indicated on drawings

B. CMUs: ASTM C90, normal weight unless otherwise indicated.

1. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
2. Exposed Faces: Provide color and texture matching the range represented by Commissioner's sample.

C. Concrete Building Brick: ASTM C55, lightweight unless otherwise indicated.

2.4 LINTELS

A. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 032000 "Concrete Reinforcing," and with reinforcing bars indicated.

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

C. Steel shelf (relieving) angles and loose lintels: Refer to Section 055000 "Metal fabrications" for additional requirements.

D. Offset Angle Supports: Steel plate brackets anchored to structure, allowing continuous insulation behind shelf angle supporting veneer. Component and anchor size and spacing engineered by manufacturer.

1. Basis-of-Design Manufacturers: Subject to compliance with requirements, provide products as supplied by FERO Corporation or comparable product by one of the following:

a. Halfen USA, Inc.
b. Hohmann & Barnard, Inc.
c. Or approved equal.

2. Carbon Steel, Galvanized after Fabrication: ASTM A1008/A1008M, with ASTM A153/A153M, Class B coating.

E. Structural thermal break material.

1. Thickness: 5/8 inch.

2. Product: Subject to compliance with requirements, provide one of the following:

    a. Armatherm; FRR.
    b. Fabreeka; TIM.
    c. Thermal Bridging Solutions; TBM-1.
    d. Or approved equal.

2.5 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels .

    a. Extruded Special Shapes and Sizes as indicated on Drawings:

        1) Solids.
        2) Lipped Brick.
        3) Bullnose.
        4) Quoins, Type 1-6.

B. Glazed Brick: ASTM C216, glazing complying with ASTM C1405,Grade SWType FBX; Full cored, 75 percent solid.

1. Basis-of-Design Products: Subject to compliance with requirements, provide Belden Brick Company (The); "La Covadonga" or comparable product by one of the following:

    a. Petersen Tegl.
    b. Wienerberger by Consolidated Brick.
    c. Or approved equal.

2. Size (Actual Dimensions): Modular, 3-5/8 inches wide by2-1/4 inches high by 7-5/8 inches long.
3. Provide Type I (single-faced units) where only one finished face is exposed when units are installed, and provide Type II (double-faced units) where two opposite finished faces are exposed when units are installed.
4. Application: Use where brick is exposed unless otherwise indicated.
5. Custom Color: Green Glazed Velour Blend.
6. Absorption: Average cold-water absorption shall not exceed 4.1 and average boiling water absorption shall not exceed 5.4.8.
7. Saturation Coefficient: Shall not exceed .78.9.
8. Brick shall be free of defects, deficiencies, and surface treatments, including coatings that interfere with proper setting or impair the strength or performance of construction.
9. Faces shall be free from cracks or other imperfections detracting from appearance when viewed from fifteen (15) feet.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce approved mortar color.

1. Alkali content will not be more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: ASTM C387. Packaged blend of Portland cement and hydrated lime containing no other ingredients.

D. Mortar Cement: ASTM C1329/C1329M.

E. Colored Cement Products: Packaged blend made from Portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Colored Portland Cement-Lime Mix:

a. Basis-of-Design Product: Subject to compliance with requirements, provide Westbrook; 162 Grey or comparable product by one of the following:

1) Holcim (US) Inc.
2) Lehigh Hanson; HeidelbergCement Group.
3) Or approved equal.

2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
3. Pigments do not exceed 10 percent of Portland cement by weight.
4. Pigments do not exceed 5 percent of mortar cement by weight.

F. Preblended Dry Mortar Mix: Packaged blend made from Portland cement and hydrated lime or mortar cement, complying with ASTM C1714/C1714M.

G. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.

H. Aggregate for Grout: ASTM C404.

I. Epoxy Pointing Mortar: ASTM C395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Commissioner from manufacturer's colors.

J. Water: Potable.

2.7 REINFORCEMENT

A. Recycled Content of Reinforcing Steel: Post-Consumer recycled content plus one-half of preconsumer recycled shall not be less than 90 percent.

B. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Heckmann Building Products, Inc.
b. Hohmann & Barnard, Inc.
c. Wire-Bond.
d. Or approved equal.

D. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Hot-dip galvanized carbon steel.
2. Exterior Walls: Stainless steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 ft., with prefabricated corner and tee units.

E. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

F. Masonry-Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, stainless steel continuous wire.

2.8 TIES AND ANCHORS

A. General: Ties and anchors extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Stainless Steel Wire: ASTM A580/A580M, Type 304.
2. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, stainless steel wire.

2. Tie Section: Triangular-shaped wire tie made from 0.25-inch- diameter, stainless steel wire.

D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

E. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

F. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100 lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.1094-inch- thick, stainless steel sheet.
3. Fabricate wire ties from 0.187-inch- diameter, stainless steel wire unless otherwise indicated.
4. Masonry-Veneer Anchors; Seismic-Pintle Plate: Rib-stiffened, sheet metal anchor section with screw holes at top and bottom, projecting leg with slotted hole for vertical leg of seismic pintle tie. Tie is rib-stiffened, sheet metal bent plate with down-turned leg to fit in anchor slot and with integral tabs to hold continuous wire in veneer.

    a. Basis-of-Design Product: Subject to compliance with requirements, provide Hohmann & Barnard, Inc.; HB213-2X or comparable product by one of the following:

        1) Heckmann Building Products, Inc.
        2) Wire-Bond.
        3) Or approved equal.

5. Stainless Steel Drill Screws for Wall Framing Support System for Continuous Insulation: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate Z-furring flange with not less than three exposed threads; either made from Type 410 stainless steel or made with a carbon-steel drill point and 300 Series stainless steel shank.

2.9 EMBEDDED FLASHING

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and Section 076200 "Sheet Metal Flashing and Trim."

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 316, 0.016 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 ft.. Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with sawtooth ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cheney Flashing Company.
2) Hohmann & Barnard, Inc.
3) Keystone Flashing Company, Inc.
4) Or approved equal.

4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop where indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
7. Fabricate metal drip edges and sealant stops for sawtooth metal flashing from plain metal flashing of same metal as sawtooth flashing and extending at least 3 inches into wall with hemmed inner edge to receive sawtooth flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam sheds water.
8. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
9. Solder metal items at corners.

B. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

E. Termination Bars for Flexible Flashing: Stainless steel bars .

2.10 ACCESSORIES

A. Control Joints: At glazed masonry units, sanded sealant; matching sealant approved for use and in compliance with Section 079200 "Joint Sealants."

B. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

C. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

D. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

E. Weep/Cavity Vents: Use one of the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Advanced Building Products Inc.
        2) Heckmann Building Products, Inc.
        3) Hohmann & Barnard, Inc.
        4) Mortar Net Solutions.
        5) Wire-Bond.
        6) Or approved equal.

F. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Mortar Deflector: Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches dimpled surface that prevent clogging with mortar droppings.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Advanced Building Products Inc.
        2) Hohmann & Barnard, Inc.
        3) Keene Building Products.
        4) Mortar Net Solutions.
        5) Wire-Bond.
        6) York Manufacturing, Inc.
        7) Or approved equal.

G. Masonry Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces.

1. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use Portland cement-lime or mortar cement mortar unless otherwise indicated.
3. For reinforced masonry, use Portland cement-lime mortar.

B. Preblended, Dry Mortar Mix for CMU only: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry (CMU), use Type S.
3. For brick, use Type N.
4. For other applications where another type is not indicated, use Type N.
5. For interior nonload-bearing CMU partitions, Type O may be used instead of Type N.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Commissioner's sample.

E. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.1.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured in accordance with ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Thickness: Build cavity walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Wetting of Brick where required: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

3.4 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.

6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.5 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated and thermally broken frame is used.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors, and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.6 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

F. Cut joints flush where indicated to receive waterproofing cavity wall insulation air barriers unless otherwise indicated.

3.7 CAVITY WALLS

A. Bond wythes of cavity walls together using bonding system indicated on Drawings or as follows:

1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.

2. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not more than 8 inches clear horizontally and 16 inches clear vertically.
3. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as indicated.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.8 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing with seismic masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached and seismic anchors to Wall Framing Support System for Continuous Insulation with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches o.c. vertically and horizontally. Install additional anchors within 12 inches of openings and at intervals, not exceeding 24 inches, around perimeter.

3.9 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick using one of the following methods:

1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.12 LINTELS

A. Install loose steel, concrete, and masonry,lintels where indicated and required by project application.

B. Shelf (Relieving) Angles: Provide offset angle support lintels where indicated and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are indicated without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

D. Structural thermal break material must be installed between the relieving angle brackets and structural supports.

3.13 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as shown on drawings and as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under air barrier, lapping at least 4 inches. Fasten upper edge of flexible flashing to sheathing through termination bar.
3. At lintels and shelf angles, extend flashing 6 inches minimum, to edge of next full unit at each end. At heads and sills, extend flashing 6 inches minimum, to edge of next full unit and turn ends up not less than 2 inches to form end dams.
4. Interlock end joints of sawtooth sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
5. Install metal drip edges with sawtooth sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.

C. Install reglets and nailers for flashing and other related construction where they are indicated to be built into masonry.

D. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use weep/cavity vent products to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.

E. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Accessories" Article.

F. Install cavity vents in head joints in exterior wythes at spacing indicated. Use specified weep/cavity vent products to form cavity vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.14 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: City of New York testing agency will perform tests and special (controlled) inspections. Allow special inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.

B. Inspections: Special inspections in accordance with Level 2 in TMS 402.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each for site-prepared mortar mix provided, in accordance with ASTM C780.

F. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

G. Prism Test: For each type of construction provided, in accordance with ASTM C1314 at 7 days and at 28 days.

3.16 CORRECTIVE WORK, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Commissioner's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean other masonry with acidic masonry cleaner applied according to manufacturer's written instructions.

3.17 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off City of New York's property.

END OF SECTION 042000

SECTION 042113.23 -SURFACE-BONDED BRICK MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior, thin brick masonry adhered to metal backing panels fastened to non-structural metal framing.
2. Thin brick masonry adhered to metal doors.
3. Adhesives, grouts, fasteners and installation accessories.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for associated masonry materials.
2. Section 081113 "Hollow Metal Doors and Frames for doors.
3. Section 092900 "Gypsum Board" for tile backing panels.

1.3 COORDINATION

A. Advise installers of other work about specific requirements for placement of items to be built into thin brick masonry.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: Manufacturer's product data and installation instructions for materials for veneer panel work. Submit other data as required to show compliance with specification requirements.

B. Shop Drawings: Shop drawings indicating brick sizes, dimensions, sections and profiles, joint patterns, and details of veneer relationships to adjacent work.

C. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

D. Samples for Initial Selection: For colored mortar and other items involving color selection.

E. Samples for Verification:

1. For each thin brick type indicated. Include at least three Samples in each set, and show the full range of color and other visual characteristics in completed Work.
2. For each color of mortar (grout) required. Label Samples to indicate types and amounts of pigments used.

1.7 INFORMATIONAL SUBMITTALS

A. Material Test Reports:

1. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer, indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of 100 sq. ft.representative of each typical condition including a vertical and a horizontal control joint in an approved location..

a. Include metal studs and sheathing in mockup.
b. Refer to Section "042000 "Unit Masonry" for other mockup requirements..

2. Protect accepted mockups from the elements with weather-resistant membrane.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing in accordance with sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

1.11 FIELD CONDITIONS

A. Environmental Requirements: Comply with manufacturer's standards and recommendations for environmental conditions before, during and after application of veneer systems.

B. Ventilation: Ventilate building spaces as required to safely cure adhesives, and to dry joint treatment material, in compliance with the manufacturer's instructions.

C. Field Measurements: Prior to the preparation of shop drawings and the fabrication of the veneer system; take accurate field measurements to ensure proper installation and fitting of system.

D. Stain Prevention: Immediately remove mortar and soil to prevent them from staining masonry face.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Description: Thin brick support products: consisting of structural galvanized steel support ledge and secure tie system for thin brick.

1. Products: Subject to compliance with requirements, provide one of the following:

a. TABS Wall Systems LLC.; TABS II panel.
b. Ambrico; EZ Wall.
c. Glen-Gery; Thin Tech.
d. Or approved equal.

B. Thin Brick Manufacturers (Types D & E): Refer to Section 042000 "Unit Masonry."

C. Style, Color and Finish: Match approved samples provided under Section 042000 "Unit Masonry."

2.2 MATERIALS

A. Thin Brick Support Panels: Architectural grade, embossed steel sheet with G-90 hot-dip galvanized coating and painted finish.

1. Flat Panels with prepunched tabs with support spacing and bracing required by thin brick units used.
2. Panels shall be 48 inches wide by lengths to suit project application.

B. Thin Brick: Kiln-fired clay brick, conforming to requirements of ASTM C1088, Grade SW, Type TBX complying with ASTM 1405 for glazed properties; as indicated by selected manufacturers product designation.

1. Size: 7 5/8 inch long by 2 1/4 inch high.
2. Shapes: As indicated on the drawings
3. Comply with requirements of Section 042000 “Unit Masonry• " as applicable to this project application.

C. Adhesives: Specially formulated adhesive meeting or exceeding ASTM C 557, ANSI A136.1 and FHA-HUD #60 requirements with a shear value between thin brick veneer and support panel of 150 psi per ASTM E 297; and approved by both manufacturers for project application.

D. Grouting Materials: Latex- Portland Cement Grout: Type S and complying with ANSI A118.4, composition as follows:

1. Prepackaged dry grout mix with either polyvinyl acetate or ethylene vinyl acetate dry polymer additive.
2. Water Emulsion Latex Additive: Add at Project site to prepackaged dry grout mix, with type of latex and dry grout mix specified or recommended by latex manufacturer.
3. Grout Colors: Match mortar used for full-depth glazed brick; Westbrook Color # 162 or approved equal

E. Cleaner: As recommended by thin brick manufacturer and in compliance with Section 042000 "Unit Masonry."

F. Compressible fill, backer rod or bond breaker tape: Where indicated and required by project application, comply with Section 079200 “Joint Sealants.”

G. Control Joints: Sanded sealant; matching sealant approved for use under Section 042000 "Unit Masonry" and in compliance with Section 079200 "Joint Sealants."

2.3 FABRICATION

A. General: Fabricate units in sizes and shapes required to comply with requirements indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine surfaces indicated to receive thin brick veneer system, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine substrate to verify that required inserts, veneer anchors, flashing and other items are correctly installed.

C. Verify that the substrate and supporting construction is sound and is acceptable to thin brick system manufacturer.

1. Wall deflection shall not exceed L/240 and surface irregularities shall be limited to 1/4 inch in 10 feet.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Comply with manufacturer's recommendations and installation instructions.

B. Tolerances:

1. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.
2. Variation from Level: For lines of exposed lintels, sills and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.
3. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.
4. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

C. Steel support panels shall be mechanically secured to a metal framing with manufacturer's approved fasteners in accordance with the manufacturer's recommendations.

1. Panels shall be attached with a minimum of one fastener per 1 square foot.
2. Fastening devices shall be of a corrosion resistant type.

D. Steel support panels applied to an oblique wall shall be installed with the support tabs aligned and level to each other.

E. Panel joints shall be staggered over insulation joints, unless unavoidable.

F. Steel support panels shall be clean, free of dirt, oil or any other surface contaminant.

G. Thin brick veneer shall be field applied in as per manufacturer's recommendations, unless otherwise indicated and as follows:

1. Thin brick shall be initially adhered to panel using specially formulated adhesive in walnut-sized dabs.
2. Veneers shall be applied within 5 to 10 minutes after adhesive has been applied. Place in the bond pattern indicated.
3. Install thin brick veneer units only on sound substrates. Maintain exposed surfaces free of setting adhesives at all times.
4. Set individual thin brick units into setting adhesive, taking care to maintain accurate joint alignment and spacing. Beat-in units to obtain 100 percent contact between back of veneer units and adhesive material.

H. Grouting:

1. When applied veneer are secure in place, fill joints and seams with specified latex-modified grout.
2. Grout vertical joints immediately following each fourth horizontal joint.
3. Grout only an area that can be tooled before grout becomes too stiff. Grout should have dull finish and be moist, but not wet.
4. With 5/8 inch rounded joint slicker tool, tool vertical and horizontal joints to have 3/8" joints, unless otherwise indicated. Force grout tight so there are no voids left in the joints. Using excess grout, fill any voids during the tooling stage, not after grout is cured.

I. Sealants: Use sealant type as recommended by thin brick manufacturer for joints in areas where veneer system meets other surfaces other than brick.

1. Provide sealant joints of widths and at locations indicated.
2. Keep sealant joints free of mortar and other rigid materials.
3. Comply with Section 079200 - Joint Sealants.

J. Where used or required, install metal expansion strips in sealant joints at locations indicated.

3.4 CLEANING AND PROTECTION

A. Veneers shall be cleaned per the appropriate method established by the Brick Institute of America for brick, Technical Bulletin #20 Revised, or the Association of Tile, Terrazzo & Marble Contractors and Affiliates bulletin "Grouting and Cleaning Ceramic Floors with Latex Grout".

B. Provide final protections and maintain conditions which ensures thin brick work being without damage or deterioration at time of Substantial Completion.

END OF SECTION 042113.23

SECTION 044200 - EXTERIOR STONE CLADDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Stone base panels set with individual anchors and mortar.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for installing inserts in unit masonry for anchoring stone cladding.
2. Section "321400 "Unit Paving" for horizontal application.

1.3 DEFINITIONS

A. Definitions contained in ASTM C119 apply to this Section.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Shop Drawings: Show fabrication and installation details for stone cladding assembly, including dimensions and profiles of stone units.

1. Show locations and details of joints both within stone cladding assembly and between stone cladding assembly and other construction.
2. Include details of joints.
3. Show locations and details of anchors and backup structure.

4. Include large-scale shaded elevations and details of decorative surfaces and inscriptions.

C. Samples for Initial Selection: For joint materials involving color selection.

D. Stone Samples for Verification: Sets for each variety, color, and finish of stone required; not less than 12 inches square.

1. Sets shall consist of at least three Samples, exhibiting extremes of the full range of color and other visual characteristics expected and will establish the standard by which stone will be judged.

E. Colored Pointing Mortar Samples for Verification: For each color required. Make Samples using same sand and mortar ingredients to be used on Project.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous three years.
2. For metal components, by a qualified testing agency, indicating chemical and physical properties of metal.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A firm or individual experienced in installing stone cladding assemblies similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Include stone base in mockup of typical exterior wall specified in Section 042000 "Unit masonry" .

a. Include typical components, attachments to building structure, and methods of installation.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.

1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
2. Store stone on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.

C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.

D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

E. Store aggregates in locations where grading and other required characteristics can be maintained and where contamination can be avoided.

1.10 FIELD CONDITIONS

A. Protect stone cladding during erection by doing the following:

1. Cover tops of stone cladding installation with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides and hold securely in place.
2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
4. Protect sills, ledges, and projections from mortar and sealant droppings.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace stone cladding damaged by frost or freezing conditions. Comply with cold-weather construction and protection requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.

C. Hot-Weather Requirements: Comply with hot-weather construction and protection requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.

D. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F or when joint substrates are wet.

1.11 COORDINATION

A. Coordinate installation of inserts that are to be embedded in concrete or masonry, flashing reglets, and similar items to be used by stone cladding Installer for anchoring, supporting, and flashing of stone cladding assembly. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.

B. Time delivery and installation of stone cladding to avoid extended on-site storage and to coordinate with work adjacent to stone cladding.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain each variety of green-grey hue stone, matching Commissioner's sample, from single quarry with resources to provide materials of consistent quality in appearance and physical properties.

1. For stone types that include same list of varieties and sources, provide same variety from same source for each.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

C. Source Limitations for Other Materials: Obtain each type of stone accessory,and other material from single manufacturer for each product.

D. Basis-of-Design Varieties and Sources: Subject to compliance with requirements, provide Vermont Structural Slate; Green Mountain Mist Quartzite or one of the following:

1. Polycor; Laurentian Green Granite.
2. Marmiro Stone; Karbon Granite.
3. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide stone anchors and anchoring systems according to ASTM C1242.

1. Stone anchors withstand not less than two times the weight of the stone cladding in both compression and tension.

B. Structural Performance: Stone cladding assembly withstands the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Wind Loads: As indicated on Structural Drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Safety Factors for Stone: Stone cladding assembly to withstand loads indicated without exceeding stone's allowable working stress determined by dividing stone's average ultimate strength, as established by testing, by the following safety factors:

1. Safety Factor for Granite: 3.
2. Safety Factor for Quartz-Based Stone: 6.

E. Stone anchors to withstand loads indicated without exceeding allowable working stresses established by the following:

1. For Structural Steel: AISC 360.
2. For Cold-Formed Steel: AISI's "North American Specification and Commentary for the Design of Cold-Formed Steel Structural Members."
3. For Cold-Formed Stainless Steel: ASCE/SEI 8, "Specification for the Design of Cold-Formed Stainless Steel Structural Members."
4. For Cast-in-Place and Postinstalled Fasteners in Concrete: One-fourth of tested capacity when installed in concrete with compressive strength indicated.
5. For Postinstalled Fasteners in Masonry: One-sixth of tested capacity when installed in masonry units indicated.

F. Corrosion and Staining Control: Prevent galvanic and other forms of corrosion as well as staining by isolating metals and other materials from direct contact with incompatible materials. Materials do not stain exposed surfaces of stone and joint materials.

2.3 GRANITE

A. Material Standard: Comply with ASTM C615/C615M.

B. Finish: Thermal.

C. Match Commissioner's samples for color, finish, and other stone characteristics relating to aesthetic effects.

D. Thickness: Not less than that indicated.

2.4 QUARTZ-BASED STONE

A. Material Standard: Comply with ASTM C616/C616M, Classification III Quartzite except for minimum free silica content.

B. Finish: Thermal.

C. Match Commissioner's samples for color, finish, and other stone characteristics relating to aesthetic effects.

D. Thickness: Not less than that indicated.

2.5 ANCHORS AND FASTENERS

A. Fabricate anchors from stainless steel, ASTM A240/A240M or ASTM A666, Type 304; temper as required to support loads imposed without exceeding allowable design stresses. Fabricate dowels and pins for anchors from stainless steel, ASTM A276, Type 304.

B. Postinstalled Anchor Bolts for Concrete and Masonry: Chemical anchors torque-controlled expansion anchors made from stainless-steel components complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 for bolts and nuts; ASTM A240/A240M, ASTM A276, or ASTM A666, Type 304 or 316, for anchors, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E488/E488M, conducted by a qualified independent testing agency.

C. Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers.

1. For stainless steel, use annealed stainless-steel bolts, nuts, and washers; for bolts, ASTM F593; and for nuts, ASTM F594, Alloy Group 1.
2. For galvanized-steel shelf angles, use carbon-steel bolts, nuts, and washers; for bolts, ASTM A307, Grade A; for nuts, ASTM A563, Grade A; and for washers, ASTM F436; all hot-dip or mechanically zinc coated.

2.6 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction, natural color or white as required to produce mortar color indicated.

B. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime.

C. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix produces color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments do not exceed 10 percent of portland cement by weight.

1. Basis-of-Design Products: Subject to compliance with requirements, provide Westbrook; 162 Grey, to match masonry mortar or comparable product by one of the following:

a. Lafarge North America Inc.
b. Lehigh Hanson; HeidelbergCement Group.
c. Or approve equal.

D. Aggregate: ASTM C144; except for joints narrower than 1/4 inch and pointing mortar, 100 percent pass No. 16 sieve.

1. White Aggregates: Natural white sand or ground white stone.
2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.

E. Water: Potable.

2.7 STONE ACCESSORIES

A. Setting Shims: Strips of resilient plastic or vulcanized neoprene, Type A Shore durometer hardness of 50 to 70, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.

2.8 FABRICATION OF STONE

A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.

1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."

B. Control depth of stone and back check to maintain minimum clearance of 1 inch between backs of stone units and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stone.

C. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.

D. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place.

E. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples.

F. Clean backs of stone to remove rust stains, iron particles, and stone dust.

G. Inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved samples and mockups.

2.9 MORTAR MIXES

A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.

1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.

B. Portland Cement-Lime Setting Mortar: Comply with ASTM C270, Proportion Specification, for types of mortar indicated below:

1. Set granite with Type S mortar.
2. Set quartz-based stone with Type N mortar.

C. Pointing Mortar: Comply with ASTM C270, Proportion Specification, for types of mortar indicated. Provide pointing mortar mixed to match Commissioner's sample and complying with the following:

1. Packaged Portland Cement-Lime Mix Mortar: Use Portland cement-lime mix of selected color.
2. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with Portland cement of selected color.
3. Point granite with Type S mortar.
4. Point quartz-based stone with Type N mortar.
5. Color: Match mortar color indicated in Section 042000 "Unit Masonry."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine surfaces to receive stone cladding and conditions under which stone cladding will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone cladding.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone cladding.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF STONE CLADDING, GENERAL

A. Before setting stone, clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

B. Execute stone cladding installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set.

1. Use power saws with diamond blades to cut stone. Produce lines cut straight and true, with edges eased slightly to prevent snipping.

C. Contiguous Work: Provide reveals, reglets, and openings as required to accommodate contiguous work.

D. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone cladding in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with uniform joints of widths indicated, and with edges and faces aligned according to established relationships and indicated tolerances.

3.4 INSTALLATION OF STONE CLADDING WITH MORTAR

A. Set stone cladding with mortar and mechanical anchors unless otherwise indicated.

B. Set stone in full bed of mortar with head joints filled unless otherwise indicated.

C. Fill space between back of stone units and backup wall solidly with mortar or grout.

D. Rake out joints for pointing with mortar to depths of not less than 1/2 inch. Rake joints to uniform depths with square bottoms and clean sides.

E. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply first layer of pointing mortar in layers not more than 3/8 inch until a uniform depth is formed.

F. Point stone joints by placing pointing mortar in layers not more than 3/8 inch. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

G. Tool joints with a round jointer having a diameter 1/8 inch larger than width of joint, when pointing mortar is thumbprint hard.

3.5 INSTALLATION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, corners and jambs within 20 feet of an entrance, expansion joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch in 40 feet or more.

B. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units.

3.6 ADJUSTING AND CLEANING

A. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and stone cladding that does not match approved samples. Damaged stone may be repaired if Commissioner approves methods and results.

B. Replace damaged or defective work in a manner that results in stone cladding's matching approved samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone cladding as work progresses. Remove excess sealant and smears as sealant is installed.

D. Final Cleaning: Clean stone cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.

END OF SECTION 044200

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Structural steel materials.
2. Shrinkage-resistant grout.
3. Shear stud connectors.

B. Related Requirements:

1. Section 053100 "Steel Decking" for field installation of shear stud connectors through deck.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.
3. Column base plates thicker than 2 inches.

D. Protected Zone: Structural members or portions of structural members indicated as "protected zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand-Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the seismic-load-resisting system and which are indicated as "demand critical" or "seismic critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
6. Shop primer.
7. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand-critical welds.
8. Identify members not to be shop primed.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand-critical welds.

D. Engineering Services Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified New York State licensed professional engineer responsible for their preparation.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer fabricator .

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

C. Mill test reports for structural-steel materials, including chemical and physical properties.

D. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Structural Steel, including certified copies of mill reports covering chemical and physical properties.

E. Survey of existing conditions.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

C. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

D. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided City of New York's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 341.
3. ANSI/AISC 360.
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Option 1: Connection designs have been completed and connections indicated on the Drawings.
2. Option 2 and 2A: Design connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer licensed in the State of New York. Member reinforcement at connections is indicated on Drawings.

a. Use Load and Resistance Factor Design; data are given at factored-load level.

3. Option 3 and 3A: Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer licensed in the State of New York.

a. Use Load and Resistance Factor Design; data are given at factored-load level.

C. Moment Connections: Type FR, fully restrained.

D. Construction: Combined system of moment frame and braced frame.

2.2 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 90 percent.

B. W-Shapes: ASTM A992/A992M ASTM A572/A572M, Grade 50 ASTM A529/A529M, Grade 50 ASTM A913/A913M, Grade 50.

C. Channels, Angles, M-Shapes: ASTM A572/A572M, Grade 50 ASTM A529/A529M, Grade 50 ASTM A913/A913M, Grade 50.

D. Channels, Angles, S-Shapes: ASTM A572/A572M, Grade 50 ASTM A529/A529M, Grade 50 ASTM A913/A913M, Grade 50.

E. Plate and Bar: ASTM A36/A36M ASTM A572/A572M, Grade 50.

F. Corrosion-Resisting (Weathering) Structural-Steel Shapes, Plates, and Bars: ASTM A588/A588M, 50 ksi.

G. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B structural tubing.

H. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.

1. Weight Class: Standard Extra strong Double-extra strong.
2. Finish: Black Galvanized Black except where indicated to be galvanized.

I. Steel Castings: ASTM A216/A216M, Grade WCB, with supplementary requirement S11.

J. Steel Forgings: ASTM A668/A668M.

K. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.

B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 490-1, compressible-washer type with plain finish.

C. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating.
2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Plain.

E. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

2.4 RODS

A. Unheaded Anchor Rods: ASTM F1554, Grade 55, weldable.

1. Configuration: Straight.
2. Nuts: ASTM A563 heavy-hex carbon steel.
3. Plate Washers: ASTM A36/A36M carbon steel.
4. Washers: ASTM F436, Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.

B. Headed Anchor Rods: ASTM F1554, Grade 55, weldable, straight.

1. Nuts: ASTM A563 heavy-hex carbon steel.
2. Plate Washers: ASTM A36/A36M carbon steel.
3. Washers: ASTM F436, Type 1, hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.

C. Threaded Rods: ASTM A36/A36M.

1. Nuts: ASTM A63 heavy-hex carbon steel.
2. Washers: ASTM F436, Type 1, hardened carbon steel.
3. Finish: Plain.

2.5 PRIMER

A. Steel Primer:

1. Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

2.6 SHRINKAGE-RESISTANT GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 3.

F. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.

H. Welded-Steel Door Frames: Build up welded-steel doorframes attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated on Drawings.

I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.9 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces unless indicated to be painted.
6. Corrosion-resisting (weathering) steel surfaces.
7. Surfaces enclosed in interior construction.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.
2. SSPC-SP 3.
3. SSPC-SP 6 (WAB)/NACE WAB-3.

C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.

D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.10 SOURCE QUALITY CONTROL

A. Special Inspections: City of New York performs all Special Inspections under a separate contract.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E165/E165M.
b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E164.
d. Radiographic Inspection: ASTM E94/E94M.

4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:

a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.

5. Testing agency to prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.4 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.5 FIELD CONNECTIONS

A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

B. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

3.6 CORRECTIVE WORK

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:

1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting.", Section 099123 "Interior Painting."

3.7 FIELD QUALITY CONTROL

A. Special Inspections: City of New York performs all Special Inspections under a separate contract:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.
4. Tests and Inspections:

a. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
b. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

1) In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a) Liquid Penetrant Inspection: ASTM E165/E165M.
b) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c) Ultrasonic Inspection: ASTM E164.
d) Radiographic Inspection: ASTM E94/E94M.

c. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1) Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2) Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

END OF SECTION 051200

SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Architecturally exposed structural steel (AESS) at monumental stair #1.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" requirements that also apply to AESS.
2. Section 057100 "Decorative Metal Stairs."
3. Section 057300 "Decorative Metal Railings" for handrails attached to monumental Stair #1.
4. Section 099113 "Exterior Painting" Section 099123 "Interior Painting" for field applied finish requirements.

1.3 DEFINITIONS

A. AESS: Architecturally exposed structural steel.

B. Category AESS 4: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 4 and is designated as AESS 4 or Category AESS 4 in the Contract Documents.

1.4 COORDINATION

A. Coordinate surface preparation requirements for shop-primed items.

B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data:

1. Shop primer.
2. Shop finish coating.

B. Shop Drawings: Show fabrication of AESS components.

1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment Drawings.
4. Indicate orientation of mill marks and HSS seams.
5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
7. Indicate exposed surfaces and edges and surface preparation being used.
8. Indicate special tolerances and erection requirements.
9. Indicate weep holes for HSS and vent holes for galvanized HSS.
10. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer shop-painting applicator.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, Category CSE, and is experienced in erecting AESS similar to that indicated on this Project.

C. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.

1. Build mockup of typical portion of AESS as shown on Drawings.
2. Coordinate painting requirements with Section 099113 "Exterior Painting." and Section 099123 "Interior Painting."

1.10 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.

1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.11 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

B. Recycled Content of Structural Steel Products: Refer to Section 051200 "Structural Steel Framing" for requirements.

2.2 PRIMER

A. Steel Primer: Single-component, moisture-cured, zinc-rich primer:

1. Product: Subject to compliance with requirements, provide one of the following:

a. Tnemec Company Inc.; Series 98 H20 Hydrozinc.
b. Sherwin-Williams Company (The); Zinc Clad 400.
c. PPG Pittsburgh Paints (PPG Industries); Equivalent product.
d. Or approved equal.

2.3 SHOP FINISHING

A. Apply one coat to surfaces.

1. Color: As selected by Commissioner.

B. Intermediate Coat: Epoxy.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Tnemec Company Inc.; Tnemec Series 48 Multi-Purpose Epoxy.
b. Sherwin-Williams Company (The); Macropoxy 646 Fast Cure.
c. PPG Pittsburgh Paints (PPG Industries); Coraflon ADF 573/574.
d. Or approved equal.

2. Thickness: 2 to 3mils DFT
3. Color(s): As selected by Commissioner.

2.4 FINISH COATINGS

A. Field-Applied Finish Coat for Exposed Ferrous Metal: Fluoropolymer.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Tnemec Company Inc.; Tnemec 1072V Fluoronar.
b. Sherwin-Williams Company (The); Fluorokem Series.
c. PPG Pittsburgh Paints (PPG Industries); Coraflon ADF.
d. Or approved equal.

2. Thickness: 2 to 3 mils DFT.

B. Color(s): As selected by Commissioner.

2.5 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.

B. Category AESS 4:

1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.

6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.
17. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Commissioner.
18. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
19. Orient HSS seams as indicated or away from view.
20. Align and match abutting member cross sections.
21. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch. At closed joints, maintain uniform contact within 1/16 inch.
22. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Commissioner.
23. Treat HSS seams to appear seamless.
24. Contour and blend welds and weld transitions between members, removing splatter exposed to view.
25. Fill surface imperfections with filler and sand smooth to achieve surface quality approved by Commissioner.
26. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

B. Weld Connections: Comply with AWS D1.1/D1.1Mfor tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.

B. Surface Preparation: Clean nongalvanized surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC SP 10 WAB/NACE WAB-2 "Near White Blast Cleaning".

C. Priming: Immediately after surface preparation, spray apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and eased edges.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments, showing dimensions, locations, angles, and elevations.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.4 ERECTION

A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.

1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.

2. Grind tack welds smooth.
3. Remove backing and runoff tabs, and grind welds smooth.
4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
5. Remove erection bolts in Category AESS 4 AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Commissioner.
6. Fill weld access holes in Category AESS 4 AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Commissioner.
7. Conceal fabrication and erection markings from view in the completed structure.

B. In addition to ANSI/AISC 303, Section 10 requirements, comply with the following.

1. Erection of Category AESS 4:

a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
b. Comply with AWS D1.1/D1.1M. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
c. Remove weld spatter, slivers, and similar surface discontinuities.
d. Grind off butt and plug weld projections larger than 1/16 inch.
e. Continuous welds shall be of uniform size and profile.
f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
g. Splice members only where indicated on Drawings.
h. No torch cutting or field fabrication is permitted.
i. Weld profiles, quality, and finish shall be as approved by Commissioner.
j. Make joint welds, including tack welds, appear continuous by filling intermittent welds.
k. Grind welds smooth.
l. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.
m. Oversize welds where ground, contoured, or blended, and grind to provide a smooth transition, matching profile approved by Commissioner.

3.5 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

3.6 FIELD FINISHING

A. Comply with Section 099123 "Interior Painting."

3.7 CORRECTIVE WORK

A. Cleaning and touchup painting are specified in Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.

B. Commissioner will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION 051213

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Composite floor deck.
2. Noncomposite form deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Composite floor deck.
2. Noncomposite form deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Qualification Statements: For welding personnel.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.3/D1.3M.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 90 percent.

2.2 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Canam Steel Corporation; Canam Group, Inc.
2. Epic Metals Corporation.
3. Nucor Corp.
4. Vulcraft; Nucor Vulcraft Group.

5. Or approved equal.

B. Fabrication of Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with SDI C, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 40 minimum, with top surface phosphatized and unpainted and underside surface shop primed with manufacturers' standard baked-on, rust-inhibitive primer.
2. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33, G60 zinc coating.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: 0.0474 inch 0.0598 inch.
5. Span Condition: As indicated Triple span or more.

2.3 NONCOMPOSITE FORM DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ASC Profiles, Inc.
2. Canam Steel Corporation; Canam Group, Inc.
3. DACS, Inc.
4. Marlyn Steel Decks, Inc.
5. Nucor Corp.
6. Vulcraft; Nucor Vulcraft Group.
7. Or approved equal.

B. Fabrication of Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite deck panels used as a form to comply with SDI NC, with the minimum section properties indicated, and with the following:

1. Profile Depth: 9/16 inch 15/16 inch 1-5/16 inches 1-1/2 inches.
2. Design Uncoated-Steel Thickness: 0.0474 inch 0.0598 inch.
3. Span Condition: As indicated.
4. Side Laps: Interlocking seam.

2.4 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel , minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI standards for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

J. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and level sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

L. Galvanizing Repair Paint: ASTM A780/A780M SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.

J. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 INSTALLATION OF FLOOR DECK

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 3/4 inch, nominal.
2. Weld Spacing:

a. Weld edge ribs of panels at each support. Space additional welds an average of 16 inches apart, but not more than 18 inches apart.
b. Space and locate welds as indicated.

3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch- long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure in accordance with SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, in accordance with SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

F. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

3.5 CORRECTIVE WORK

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.6 FIELD QUALITY CONTROL

A. Special Inspections: City of New York performs all Special Inspections under a separate contract.

B. Tests and Inspections:

1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.

    a. Field welds will be subject to inspection.

2. Steel decking will be considered defective if it does not pass tests and inspections.
3. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:

    a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
    b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors that are already tested.

C. Testing agency to prepare test and inspection reports.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.
2. Soffit framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
3. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Vertical deflection clips.
4. Single deflection track.
5. Double deflection track.
6. Drift clips.
7. Soffit framing.

8. Post-installed anchors.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Environmental Product Declaration: For each product.
3. Health Product Declaration: For each product.
4. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

D. Engineering Services Submittal: For cold-formed steel framing.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of code-compliance certification for studs and tracks.

C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Mechanical fasteners.
4. Vertical deflection clips.
5. Horizontal drift deflection clips
6. Miscellaneous structural clips and accessories.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ClarkDietrich.
2. Jaimes Industries.
3. MarinoWARE.
4. Telling Industries.
5. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Structural Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

    a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600 of the wall height, unless otherwise required by brick veneer requirements.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

    a. Upward and downward movement of 1/2 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and AISI S200 and ASTM C955, Section 8.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Framing Members, General: Comply with AISI S200 and ASTM C955, Section 8 for conditions indicated.

C. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G90 or equivalent.

D. Steel Sheet for Vertical Deflection Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90 or equivalent.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 54 mils; 0.0538 inch (16 gage)
2. Flange Width: 1-5/8 inches unless otherwise indicated.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.unless otherwise indicated and required.

C. Vertical Deflection Clips, Exterior: Manufacturer's standard bypass head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.

2. Flange Width: 1 inch plus twice the design gap for other applications.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

a. Minimum Base-Metal Thickness: Matching steel studs.
b. Flange Width: 1 inch plus twice the design gap for other applications.

2. Inner Track: Of web depth indicated, and as follows:

a. Minimum Base Metal Thickness: Matching steel studs.
b. Flange Width: Dimension equal to sum of outer deflection track flange width plus 1 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 54 mils; 0.0538 inch (16 gage).
2. Flange Width: 1-5/8 inches, minimum.

2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36 Grade 55, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report based on ICC-ES AC01 ICC-ES AC193 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M SSPC-Paint 20.

B. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

C. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

2.9 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.4 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.5 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Install according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track unless otherwise required. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 CORRECTIVE WORK

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

A. Special Inspections: City of New York agency ill perform tests and special (controlled) inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for mechanical and electrical equipment.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Steel shapes for supporting elevator door sills.
4. Slotted channel framing.
5. Metal ladders for access to elevator pit, detention tank, AHU catwalk, and vegetated roof.
6. Ejector pit pump cover.
7. Elevator pit sump covers.
8. Miscellaneous steel trims.

B. Products furnished, but not installed, under this Section include the following:

1. Shelf (Relieving) angles.
2. Loose steel lintels.
3. Anchor bolts, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Requirements:

1. Section 042000 "Unit Masonry" for installing loose lintels, shelf angles, anchor bolts, and other items built into unit masonry.
2. Section 051200 "Structural Steel Framing" for steel framing, supports, elevator hoist beams and other steel items attached to the structural-steel framing.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Fasteners.
2. Shop primers.
3. Shrinkage-resisting grout.
4. Slotted channel framing.
5. Manufactured metal ladders.
6. Shelf (Relieving) angles.
7. Loose steel lintels.

B. Sustainable Design Submittals:

1. Environmental product declaration.

C. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for mechanical and electrical equipment.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Steel shapes for supporting elevator door sills.
4. Metal ladders.
5. Elevator pit sump covers.
6. Ejector pit pump cover.
7. Miscellaneous steel trim.

D. Samples for Verification: For each type and finish of extruded nosing.

E. Engineering Services Submittal: For aluminum ladders, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For New York State licensed professional engineer's experience with providing engineering services of the kind indicated.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York to design aluminum ladders.

B. Structural Performance of Aluminum Ladders: Ladders are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.

C. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

D. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: As indicated.
2. Material: Galvanized steel, ASTM A653/A653M, commercial steel, Type B, with G90 coating; 0.079-inch nominal thickness.

F. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

G. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

H. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

I. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

J. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

K. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening aluminum or stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

E. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

G. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting." Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Galvanize miscellaneous framing and supports.

2.7 SHELF (RELIEVING) ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to framing. Coordinate bolt hole size and spacing, and any other required penetrations,with relieving angle brackets specified in Section 042000, Unit Masonry.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. Galvanize shelf angles located in exterior walls.

2.8 METAL LADDERS

A. General:

1. Comply with ANSI A14.3, except for elevator pit ladders.

2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Aluminum Ladders:

1. Basis-of-Design Product: Subject to compliance with requirements, provide O'Keeffe's Inc.; LAD 500 for ladders L1 & L3 and LAD 502/ off-floor mounting for ladder L2, L4, and L5 or comparable product by one of the following:

a. Fixfast USA.
b. Precision Ladders, LLC.
c. Thompson Fabricating, LLC.
d. Or approved equal.

2. Source Limitations: Obtain aluminum ladders from single source from single manufacturer.
3. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.
4. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.
5. Fit rungs in centerline of siderails; fasten by welding or with stainless steel fasteners or brackets and aluminum rivets.
6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted aluminum brackets.
7. Provide minimum 72-inch- high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

C. Interior Finish: Mill.

D. Exterior Finish: Powder-coated, as selected by Commissioner from manufacturers full range.

1. Color(s): As selected using RAL European color matching system.

2.9 ELEVATOR PIT SUMP AND EJECTOR PIT PUMP COVERS

A. Fabricate from welded or pressure-locked galvanized steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.

B. Provide galvanized steel angle supports unless otherwise indicated.

C. Structural Performance: Covers and supports to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft. unless otherwise required by Building Code for project application.

2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Prime miscellaneous steel trim with zinc-rich primer.

2.11 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.12 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

2.13 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with zinc-rich primer .

D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

F. Powder-Coat Finish, Galvanized: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:

1. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
2. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils.

2.15 ALUMINUM FINISHES

A. As-Fabricated (Mill) Finish: AA-M12.

B. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.3 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Shelf (Relieving) angles and Lintels: Refer to Section 042000 "Unit Masonry" for requirements.

3.4 CORRECTIVE WORK

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Stairs 2, 3, and 4: Preassembled steel stairs with concrete-filled treads.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" miscellaneous support items.
2. Section 055200 "Metal Railings" for railings and guards.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs.

1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
2. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For metal pan stairs and the following:

1. Shop primer products.

B. Sustainable Design Submittals:

1. Environmental product declaration.
2. Environmental Product Declaration (EPD): For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.

1.6 INFORMATIONAL SUBMITTALS

A. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Fabricator of products.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

    a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

1. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.

C. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

D. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

E. Galvanized Steel Sheet: ASTM A653/A653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

F. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.2 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls.

1. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be shop primed with zinc-rich primer.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting." Zinc-Rich Primer: Comply with SSPC-Paint 20, Type II, Level 2, and compatible with topcoat.

C. Shop Primer for Galvanized Steel: Primer formulated for use over zinc-coated metal and compatible with finish system indicated.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Nonmetallic, Shrinkage-Resistant Grout: Refer to Section 055000 "Metal Fabrications."

2.4 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings and guards, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 - No evidence of welded joint.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that will be exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.5 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Stringers: Fabricate of steel plates.

a. Stringer Size: As required to comply with "Performance Requirements" Article and indicated on Drawings.
b. Provide closures for exposed ends of channel and rectangular tube stringers.
c. Finish: Shop primed.

2. Platforms: Construct of steel plate headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.

a. Finish: Shop primed.

3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.

a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

1. Galvanized steel sheet, unless otherwise indicated.
2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
3. Shape metal pans to include nosing integral with riser.
4. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.6 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

C. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF METAL PAN STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.

1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.

a. Clean bottom surface of plates.
b. Set plates for structural members on wedges, shims, or setting nuts.
c. Tighten anchor bolts after supported members have been positioned and plumbed.
d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.

1) Neatly finish exposed surfaces; protect grout and allow to cure.
2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Comply with requirements for welding in "Fabrication, General" Article.

F. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

3.4 INSTALLATION OF RAILINGS AND GUARDS

A. Refer to Section 055200 "Metal Railings."

3.5 CORRECTIVE WORK

A. Touchup Painting:

1. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

B. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055113

SECTION 055200 - METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Stairs ST2, ST3, and ST4: Interior steel railings.
2. Stair ST2: Metal (infill) panel guardrails.
3. Guardrails at roof: Exterior painted steel railings.
4. AHU catwalk: Galvanized steel guardrails.

B. Related Requirements:

1. Section 055113 "Metal Pan Stairs" for attachment of railings.
2. Section 057100 "Decorative Metal Stairs" for attachment of railings.
3. Section 064023 "Interior Architectural Woodwork" for wood railings.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of mechanically connected railings.
2. Metal infill panels.

3. Fasteners.
4. Post-installed anchors.
5. Shop primer.
6. Metal finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required.

1. Fittings and brackets.
2. Assembled Sample of railing system 24 inches long, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

a. Show method of connecting and finishing members at intersections.

D. Engineering Services Submittal: For railings, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer licensed in the State of New York.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

C. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL RAILINGS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.

C. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

D. Plates, Shapes, and Bars: ASTM A36/A36M.

E. Metal Infill Panels:

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, or hot-rolled steel sheet, ASTM A1011/A1011M, commercial steel, Type B, 0.120 inch thick, unless otherwise indicated on drawings and approved by Commissioner.

2.4 FASTENERS

A. Fastener Materials:

1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report, based on ICC-ES AC193 or ICC-ES AC308.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Cast iron unless otherwise indicated .

B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

D. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

F. Bituminous Paint: Cold-applied asphalt emulsion, complying with ASTM D1187/D1187M.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.
2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water.

1. Provide weep holes where water may accumulate.
2. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded or nonwelded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 welds; good appearance, completely sanded joint, some undercutting and pinholes okay

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection, using an epoxy structural adhesive, if this is manufacturer's standard splicing method.

J. Form changes in direction as follows:

1. As detailed.
2. By bending or by inserting prefabricated elbow fittings.
3. By flush bends.
4. By radius bends of radius indicated.
5. By bending to smallest radius that will not result in distortion of railing member.

K. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
2. Coordinate anchorage devices with supporting structure.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings; AHU catwalk guardrails:

1. Hot-dip galvanize steel railings, including hardware, after fabrication.
2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
4. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, hot-dip galvanize anchors to be embedded in exterior concrete or masonry.

D. Preparation for Shop Priming; Interior Railings: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3.

E. Primer Application; Interior Railings: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with zinc-rich primer .

F. Field Finish; Interior Railings: In accordance with Section 099123 "Interior Painting"

G. Powder-Coat Finish; Exterior Painted Steel Railings: AAMA 2604, for exterior durability. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Appearance: Smooth.
2. Gloss: 80 @ 60 degrees.
3. Salt Spray: 1000 hours pass (ASTM B-117).
4. Humidity Resistance: 1000 hours pass (ASTM D-1735)
5. Recommended Bake: 10 Minutes @ 400 degrees Metal Temperature, See Cure Curve PCT-001.
6. Color and Gloss: Match RAL Classic 9018, Papyrus White as approved by Commissioner.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.3 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.4 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.5 ATTACHING RAILINGS

A. Attach railing post to stringers by welding, post must be finished to match handrails.

B. Attach handrails to walls with wall bracket as indicated on drawings. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows and per the architectural details:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements, using self-tapping screws of size and type required to support structural loads.
4. Use countersunk fasteners.

3.6 CORRECTIVE WORK

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 055200

SECTION 057000 - DECORATIVE METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Decorative window trim.
2. Decorative fin tube covers and frames.
3. Custom bollards to support power door operators.
4. Cased openings.
5. Cased opening, custom stainless steel threshold.
6. Entry door, custom stainless steel threshold.
7. Elevator entrance trim.

B. Related Requirements:

1. Section 057300 "Decorative Metal Railings" for decorative metal railings.
2. Section 084213 "Aluminum-framed Entrances and Storefronts."
3. Section 087113 "Power Door Operators."

1.3 COORDINATION

A. Coordinate installation of anchorages for decorative metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of bollards with Sections 084213 "Aluminum-framed Entrances and Storefronts" and 087113 "Power Door Operators" for location and connection to access control.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Shop Drawings: Show fabrication and installation details for decorative metal items including convector units and bollards.

1. Include plans, elevations, component details, and attachment details.
2. Indicate materials and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

C. Engineering Services Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

D. Coordination Drawings: For convector unit enclosures. Show dimensions of heating-cooling units, including locations of housing penetrations and attachments, and necessary clearances.

E. Samples for Initial Selection: For products involving selection of color, texture, or design.

F. Samples for Verification: For each type of exposed finish.

1. Sections of linear shapes.
2. Samples of welded joints showing quality of workmanship and color matching of materials.

1.7 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Fabricator of products.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
2. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.9 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups for the following types of decorative metal:

a. Decorative window trim.
b. Cased openings.
c. Custom bollards.
d. Fin tube enclosures.
e. Cased opening threshold.
f. Entry door threshold.
g. Elevator entrance trim.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store decorative metal in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

B. Deliver and store cast-metal products in wooden crates surrounded by enough packing material to ensure that products are not cracked or otherwise damaged.

1.11 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York to design convector unit enclosures.

B. Structural Performance: Convector unit enclosures shall withstand the effects of gravity loads and the following loads and stresses without exceeding the allowable design working stress of materials involved and without exhibiting permanent deformation in any components:

1. Live Loads: 100 lbf/sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. in. whichever produces the greater stress.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Use materials with smooth, flat surfaces unless otherwise indicated. Use materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.3 ALUMINUM

A. Fabricate products from alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

B. Bars and Shapes: ASTM B221, Alloy 6063-T5/T52.

C. Plate and Sheet: ASTM B209, Alloy 3003-H14 or Alloy 5005-H32.

2.4 STAINLESS STEEL

A. Castings: ASTM A743/A743M, Grade CF 8 or Grade CF 20.

B. Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.

C. Flat Bar: ASTM A666, Type 316.

D. Bars and Shapes: ASTM A276, Type 304.

2.5 STEEL AND IRON

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A36/A36M.

D. Steel Sheet, Cold Rolled: ASTM A1008/A1008M, either commercial steel or structural steel, exposed.

2.6 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:

1. Aluminum Items: Aluminum fasteners with coating to match aluminum color and type.
2. Stainless Steel Items: Stainless steel fasteners, Type 316 for exterior use and Type 304 or interior use.
3. Dissimilar Metals: Stainless steel fasteners, type for use location indicated.

B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.

C. Provide concealed fasteners for interconnecting components and for attaching decorative metal items to other work unless otherwise indicated.

1. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with an evaluation report based on ICC-ES AC193 or ICC-ES AC308.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5 unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

2.8 FABRICATION, GENERAL

A. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.
3. Use connections that maintain structural value of joined pieces.

B. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

1. Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

D. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

E. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.

F. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.

G. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.

1. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.

2.9 DECORATIVE WINDOW AND CASED OPENINGS

A. Material, design and plate thickness: Aluminum as indicated on the Drawings.

B. Finish and Color: Match adjacent curtain wall. Refer to Section 084423 "Structural-Sealant-Glazed Curtain Walls."

C. Fabricate decorative trim in accordance with approved shop drawings.

2.10 ELEVATOR ENTRANCE TRIM

A. Design and plate thickness: As indicated on the Drawings.

B. Stainless Steel Finish: #4 satin.

C. Fabricate trim in accordance with approved shop drawings.

2.11 DECORATIVE FIN TUBE COVERS AND ENCLOSURES

A. Fabricate decorative covers from solid and perforated aluminum sheet or plate of thickness, size, and pattern indicated. Form perforations by punching, cutting, or drilling to produce openings of sizes and shapes indicated. Roll, press, and grind perforated metal to flatten and to remove burrs and deformations.

1. Drawings indicate perforated metal patterns.

B. Fabricate frames from profiles and to sizes and shapes indicated

C. Incorporate removable tops and fronts where indicated or needed for access to fin tube units and to piping, ductwork, controls, and electrical service, with panels and openings as follows:

1. Fabricate with a fitting tolerance of not more than 1/16 inch at each edge, with face of panels flush with adjoining fixed surfaces of enclosure.
2. Form panels for easy removal without interfering with adjoining construction or furniture. Hold panels in place with countersunk screws and hardware that prevent warp and rattle.

D. Coordinate configuration and dimensions of enclosures with fin tube unit. Provide support for units and controls where indicated. Provide blind knockouts and supports for piping and wiring where indicated or required.

E. Locate fixed surfaces of enclosure to coincide precisely with window mullions and partition system terminations. Provide closures at ends of units, at recessed openings in base of units, and at other locations where needed to conceal unfinished wall or floor surfaces, and piping.

F. Finish and Color: Match adjacent curtain wall. Refer to Section 084423 "Structural-Sealant-Glazed Curtain Walls.".

2.12 CUSTOM METAL BOLLARDS

A. Fabricate metal bollards from 1/4-inch wall-thick stainless steel, ASTM A480/A480M, No. 4 finish or other shapes, unless otherwise indicated on drawings.

1. Cap bollards with 1/4-inch- (6.4-mm-) thick, stainless steel, plate.
2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
3. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.

B. Fabricate sleeves for bollard anchorage from stainless steel plate with 1/4-inch- thick, stainless steel base plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.

C. Finish for Exposed Surfaces: ASTM A480/A480M, No. 4.

2.13 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.14 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Color and Gloss: Match curtain wall as specified in Section 084423 "Structural-Sealant-Glazed Curtain Walls."

2.15 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.

C. Stainless Steel Tubing Finishes:

1. 180-Grit Polished Finish: Uniform, directionally textured finish.

D. Stainless Steel Sheet and Plate Finishes:

1. Directional Satin Finish: ASTM A480/A480M, No. 4.

E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

F. Bead Blast Finishing: Blasting method in which media being blasted is a sphere, generally glass or zirconia, to produce a silvery white surface.

1. Project Use: Thresholds, matching Commissioner's approved sample.

2.16 STEEL AND IRON FINISHES

A. Powder-Coat Finish, Nongalvanized: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:

1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils.
4. Color: As selected by Commissioner from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.

B. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.

C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.

D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.

F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.

1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.

G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

H. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

3.4 INSTALLATION OF DECORATIVE FIN TUBE COVERS

A. Mount decorative cover in subframe with color matching countersunk screws and align joints with centerlines of curtain wall mullions.

B. Secure to subframing substrate.

3.5 INSTALLATION OF METAL BOLLARDS

A. Anchor bollards to existing construction with expansion anchors or anchor bolts. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.

1. Embed anchor bolts at least 4 inches in concrete.

B. Anchor bollards in concrete with sleeves anchored into concrete.

3.6 CLEANING AND PROTECTION

A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

B. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Protect finishes of decorative metal from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.

D. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057000

SECTION 057100 - DECORATIVE METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Monumental Stair #1: Decorative metal stairs with terrazzo treads.
2. Shoe support for glass guardrails.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing."
2. Section 057000 "Decorative Metal Railings."
3. Section 088000 "Glazing" for glass and accesoories used in guardrails.
4. Section 096623 "Resinous Matrix Terrazzo Flooring" for field-cast terrazzo landings and precast treads.
5. Section 265119 "LED Interior Lighting" for lighting integrated into stair stringers.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs.

1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
2. Deliver such items to Project site in time for installation.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Shoe support for glass guardrails.
4. For lighting, at stringers include rough-in details and wiring diagrams.

B. Samples for Verification: For each type and finish of tread.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance of Stairs: As indicated on Structural Drawings and required by the NYC Building Code.

1. Metal stairs shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated
2. Minimum Natural Frequency: Vertical 5 Hz, and Horizontal 2.5 Hz.

B. Seismic Performance of Stairs: As indicated on Structural Drawings and required by 2014 New York City Building Code.

2.2 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 interior use, and Type 304 stainless steel fasteners for use with aluminum shoe.

B. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941/F 1941M, Class Fe/Zn 5, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Zinc-Rich Primer: Complying with SSPC-Paint 20, Type I-A, Level 1, and compatible with topcoat.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 - No evidence of a welded joint.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.

2.6 FABRICATION OF STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Architectural Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Stringers: Fabricate stringers of steel plates as indicated on Drawings.

a. Stringer Size: As indicated on Drawings.
b. Provide closures for exposed ends of stringers.
c. Finish: AESS.

2. Platforms: Construct platforms of steel plate headers and miscellaneous framing members as indicated on Drawings.

a. Provide closures for exposed ends of framing.

b. Finish: AESS.

3. Weld stringers to headers; weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

C. Subtreads, Risers, and Subplatforms:

1. Fabricate subtreads and subplatforms of steel plates and shapes indicated on Drawings.
2. Finish: AESS.
3. Weld subtreads to stringers.

a. Locate welds on top of subtreads where they will be concealed by finished treads.

4. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads.

a. Weld subplatforms to platform framing.
b. Locate welds on top of subplatforms where they will be concealed by finished flooring.
c. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.7 STAIR RAILINGS

A. Comply with requirements in Section 055200 "Metal Railings" and 057300 "Decorative Metal Railings"

1. Connect posts to stair framing by direct welding unless otherwise indicated.
2. Exposed Welds: Match metal stair requirements per paragraph 2.6. F.5 in this section.

B. Exposed shoe: Extruded aluminum.

1. Shoe support: As detailed on drawings.

C. Glass Type GL-8: Refer to Section 088000 "Glazing."

2.8 FINISHES

A. Comply with Section 051213 "Architecturally Exposed Structural Steel Framing (AESS).

B. Steel Shop Prime Finish:

1. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." unless otherwise indicated.
2. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting.

a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

C. Shop Finishing: In accordance with Section 051213 "Architecturally Exposed Structural Steel Framing."

D. Field Finishing: One spray-applied coat in accordance with Section 099123 "Interior Painting."

E. Aluminum Finishes:

1. Type and Color: As selected by Commissioner.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLING METAL STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.

1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

E. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

F. Install precast terrazzo treads according to manufacturer's written instructions.

END OF SECTION 057100

SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Stair #1: Interior steel decorative railings.
2. Glass guardrails.
3. Smoke baffle system.

B. Related Requirements:

1. Section 055200 "Metal Railings" for non-ornamental railings.
2. Section 057100 "Decorative Metal Stairs" for attachment of railings.
3. Section 064023 "Interior Architectural Woodwork" for wood railings.
4. Section 088000 "Glazing" for glass and accessories used in guardrails and smoke baffle.

1.3 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible.

B. Coordinate installation of railings with Section 057100 "Decorative Metal Stairs.".

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Smoke baffle system
2. Fasteners.
3. Post-installed anchors.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.

1. Each type of Railing: Coordinate with Section 057100 "Decorative Metal Stairs."
2. Glass guardrails.
3. Smoke baffle system.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer licensed in the State of New York.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups for each form and finish of railing, consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches in length.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.3 STEEL DECORATIVE RAILINGS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.

2.4 GLASS GUARDRAILS

A. Exposed shoe: Painted steel.

1. Shoe support: Refer to Section 057100 "Decorative Metal Stairs."
2. Color: As selected by Commissioner.

B. Glass Type GL-8: Refer to Section 088000 "Glazing."

2.5 SMOKE BAFFLE SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide CRL-Blumcraft SB-200, 2-piece smoke baffle system or comparable product by one of the following:

1. Livers Bronze Co.

2. VIVA Railings, LLC.
3. Or approved equal.

B. Base shoe: Extruded aluminum.

1. Color: As selected by Commissioner.

C. Glazing: 1/2 thick tempered low-iron glass.

2.6 FASTENERS

A. Fastener Materials:

1. Aluminum Components: Type 304 stainless steel fasteners.
2. Ungalvanized-Steel Railing Components: Plated-steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for electrodeposited zinc coating where concealed; Type 304 stainless steel fasteners where exposed.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Fasteners for securing Wood Handrails to Steel Shapes: Select fasteners of type, grade, and class required to produce connections capable of withstanding design loads.

1. Use countersunk tamperproof type fasteners.
2. Color: Matching painted handrail as determined by Commissioner.

D. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For stainless steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Epoxy Zinc-Rich Primer: Compatible with topcoat.

2.8 FABRICATION

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.
2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water.

1. Provide weep holes where water may accumulate.
2. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

I. Form changes in direction as follows:

1. As detailed.

J. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Brackets, Flanges, Fittings, and Anchors: Provide miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.10 ALUMINUM FINISHES

A. Glass Guardrail Shoe: As specified in Section 057100 "Decorative Metal Stairs."

B. Smoke Baffles: Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.11 STEEL FINISHES

A. As specified in Section 057100 "Decorative Metal Stairs."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings and smoke baffles.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings and smoke baffles level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings and smoke baffles accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components and smoke baffles that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Align rails and smoke baffles so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Adjust railings and smoke baffles before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners, sized to suit project application, where necessary for securing railings and smoke baffles to properly transfer loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

3.4 GLASS GUARDRAILS

A. Install in accordance with approved shop drawings.

3.5 SMOKE BAFFLE SYSTEM

A. Install in accordance with approved shop drawings.

3.6 CORRECTIVE WORK

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.7 PROTECTION

A. Protect finishes of railings and smoke baffles from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057300

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior fire-retardant-treated plywood sheathing.
2. Plywood and solid wood blocking and nailers.
3. Wood furring.
4. Plywood backing panels.

B. Related Requirements:

1. Section "064216 "Flush Wood Paneling" for fire-retardant-treated wood paneling.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Lumber grading agencies, and abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
3. Product Data: For installation adhesives, indicating VOC content.
4. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Qualification Statements: For testing agency providing classification marking for fire-retardant treated material, an inspection agency that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2.2 FIRE-RETARDANT TREATMENT

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

D. Application: Treat items indicated on Drawings, and the following:

1. Sheathing.
2. Concealed solid or composite wood blocking.
3. Plywood backing panels.

2.3 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:

1. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
2. Eastern softwoods; No. 2 Common grade; NeLMA.
3. Northern species; No. 2 Common grade; NLGA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 INTERIOR SHEATHING

A. Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 5/8 inch nominal thickness.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.

2. For pressure-preservative-treated wood, use stainless steel fasteners.

B. Post-Installed Anchors: Fastener systems with an evaluation report based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

2.7 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

1. Adhesives: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements." .

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Install plywood sheathing in conjunction with adhered brick veneer and paneling indicated by fastening to framing.Install fire-retardant-treated plywood panels with classification marking of testing agency exposed to view.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

E. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.

2. Use copper naphthenate for items not continuously protected from liquid water.

G. Securely attach rough carpentry work to substrate by anchoring and fastening, using components complying with the Building Code of the City of New York.

3.3 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.4 INSTALLATION OF WOOD FURRING

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.5 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Gypsum wall sheathing.
2. Sheathing joint and penetration treatment materials.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include location of any required .

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Certainteed; SAINT-GOBAIN
b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. National Gypsum Company.
e. USG Corporation.
f. Or approved equal.

2. Type and Thickness: Type X, 5/8 inch thick.

2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

E. Control Joints: Include at each floor level to accommodate live load deflection.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.3 INSTALLATION OF GYPSUM SHEATHING

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

E. Seal sheathing joints according to with sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior standing and running trim transparent finish.
2. Interior running trim (base) for opaque (painted) finish.
3. Wood frames for glass with finish as indicated.
4. Interior wood railings.
5. Custom-made librarian desks, built-in counters, and other items indicated on drawings.
6. Solid surface material countertops and splashes.
7. Plastic-laminate inset material for desks and coutertops.
8. Miscellaneous materials.
9. Shop priming for opaque finish woodwork.
10. Shop finishing for transparent finish woodwork.

B. Related Requirements:

1. Section 057300 "Decorative Metal Railings" for railings for monumental Stair ST1.
2. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.
3. Section 064216 "Flush Wood Paneling" for fire-retardant-treated wood paneling.
4. Section 088000 "Glazing" for glass in wood frames.

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.

B. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

C. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each regional material.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
5. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
6. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.

D. Shop Drawings:

1. Include the following:

a. Dimensioned plans, elevations, and sections.
b. Attachment details.

2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.

E. Samples for Initial Selection: For each type of shop-applied exposed finish.

1. Size:

a. Panel Products: 12 inches by 12 inches.
b. Lumber Products: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

F. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished interior architectural woodwork.
3. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches wide by 12 inches long for lumber and 12 by 12 inches for panels, for each finish system and color.

    a. Finish one-half of exposed surface.

4. Solid surface material.
5. Plastic-laminate material.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For architectural woodwork manufacturer and Installer.

B. Product Certificates: For the following:

1. Composite wood products.
2. Adhesives.
3. Plastic-laminate.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer Qualifications: Manufacturer meeting the requirements in DDC General Conditions Section 014000 1.7/C/5.

C. Installer Qualifications: Entity approved by manufacturer.

D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of librarian desk and other interior architectural woodwork as selected by Commissioner.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Architectural Woodwork Standards, Section 2.

B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.

C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

A. Environmental Limitations with Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.11 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

B. Coordinate locations of utilities that will penetrate countertops.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations: Fabricator to assume undivided responsibility for production of ornamental woodwork, wood trim, wood frames, and wood doors faced with veneers from same flitches as paneling.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bauerschmidt & Sons.
2. Champion Millwork, Inc.
3. Digifabshop.
4. Four Daughters, LLC.
5. Island Architectural Woodwork, Inc.
6. Legere Goup, Ltd.
7. Miller Blaker, Inc.
8. PGS Millwork, Inc.
9. Or approved equal.

2.3 WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

2.4 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: Premium.

B. Hardwood Lumber:

1. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.

2.5 INTERIOR RUNNING TRIM (BASE) FOR OPAQUE (PAINTED) FINISH

A. Architectural Woodwork Standards Grade: Premium.

1. Wood Species: Any closed-grain hardwood Eastern white pine, sugar pine, or western white pine Poplar.
2. Wood Moisture Content: 5 to 10 percent.
3. Finger Jointing: Allowed.
4. Gluing for Width: Not allowed.
5. Face Surface: Surfaced (smooth).

2.6 INTERIOR WOOD RAILINGS

A. Architectural Woodwork Standards Grade: Premium.

B. Wood for Transparent Finish:

1. Species and Cut: As indicated or selected by Commissioner.
2. Wood Moisture Content: 5 to 10 percent.

C. Wood for Opaque Finish:

1. Species: Any closed-grain hardwood.

D. Handrail Brackets: Cast nickel-silver unless otherwise indicated or selected by Commissioner, with wall flange drilled and tapped for concealed hanger bolt and with support arm for screwing to underside of rail. Size to provide 1-1/2-inch clearance between handrail and face of wall unless otherwise indicated.

2.7 DESKS, BUILT-IN COUNTERS, AND OTHER ITEMS

A. Architectural Woodwork Standards Grade: Premium.

B. Wood for Transparent Finish:

1. Species and Cut: White oak; rift cut

C. Wood for Opaque Finish: As indicated on Drawings or selected by Commissioner.

1. Species: Poplar, finger jointing allowedAny closed-grain hardwood.
2. Wood Moisture Content: 5 to 10 percent.

D. Wood Finish: As indicated on Drawings or selected by Commissioner.

2.8 SOLID SURFACE MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ISFA 2-01.

B. Basis-of-Design Product: Subject to compliance with requirements, provide E. I. du Pont de Nemours and Company; Corian or comparable product by one of the following:

1. Formica Corporation.
2. LG Chemical, Ltd.
3. Porcelanosa.
4. Wilsonart LLC.
5. Or approved equal.

C. Type: Provide Standard type unless Special Purpose type is indicated.

D. Color: Glacier white unless otherwise indicated.

E. Plywood substrate for Countertops: Marine grade plywood.

F. Adhesive: Product recommended by solid surface material manufacturer.

G. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

2.9 SHEET MATERIALS

A. Composite Wood Products: Provide materials that comply with requirements of the Architectural Woodwork Standards for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.

1. Composite Wood Products: Products shall be made without urea formaldehyde.
2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.10 PLASTIC-LAMINATE FOR INSETS

A. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

B. Basis-of-Design Products: Subject to compliance with requirements, provide_Formica Corporation; Color Core or comparable product by one of the following:

1. Abet Laminati Inc.
2. Pionite; a Panolam Industries International, Inc. brand.
3. Wilsonart LLC.
4. Or approved equal.

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated on drawings or selected by Commissioner.

2.11 HARDWARE AND ACCESSORIES

A. General: Provide hardware and accessory materials associated with items constructed under this section.

B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening.

1. Basis-of-Design Products: Subject to compliance with requirements, provide Salice CA-C2-6A99 & CA-C2-6G99 with BARGL/F or comparable product from one of the following:

a. Hafele.
b. Blum, Julius & Co., Inc.
c. Grass.
d. Or approved equal.

C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Hafele, Veranda Collection; Librarian Desks: 117.05.600 and Cabinets: 117.05.600 or comparable product from one of the following:

a. Blum, Julius & Co., Inc.
b. Grass.
c. Or approved equal.

D. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.

E. Drawer Slides: ANSI/BHMA A156.9.

1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): .

a. Type: Full overtravel extension.
b. Material: Stainless steel slides.
c. Motion Feature:Soft close dampener.

F. Grommets for Cable Passage:

1. Description: Solid brass grommets with MM4A liner with MM4 cap, 17S satin nickel finish.
2. Basis-of-Design Products: Subject to compliance with requirements, provide Doug Mockett; MM series or comparable product from one of the following:

    a. Hafele.
    b. Sugatsune America, Inc.
    c. Or approved equal.

3. Size: As indicated on drawings.

G. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

1. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.12 MISCELLANEOUS MATERIALS

A. Countertop Supports:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Rakks; EH series or comparable product from one of the following:

    a. Federal Brace.
    b. CounterBalance Shop.
    c. Or approved equal.

2. Depth as required.
3. Finish: As selected by Commissioner.

B. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

C. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.

D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

E. Adhesives: Do not use adhesives that contain urea formaldehyde.

F. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.13 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:

1. Interior standing and running trim.

B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

1. Ease edges to radius indicated for the following:

a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
b. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
3. Notify Commissioner seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.

a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

D. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.
2. Configuration unless otherwise indicated on Drawings:

a. Front: Straight, slightly eased at top.
b. Countertops: 3/4-inch- thick, solid surface material.

3. Backsplashes: 3/4-inch- thick, solid surface material.
4. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

a. Fabricate with loose backsplashes for field assembly.

5. Joints:Fabricate countertops without joints.

2.14 SHOP PRIMING

A. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 099123 "Interior Painting."

1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

B. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and finish as selected by Commissioner .

1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

2.15 SHOP FINISHING

A. Finish interior architectural woodwork with transparent finish at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Finish System: Use one of the following as indicated or selected by Commissioner.

a. Finish System - 1: Lacquer, Nitrocellulose.
b. Finish System - 4: Latex Acrylic, Water Based.
c. Finish System - 5: Varnish, Conversion.
d. Finish System - 7: Vinyl, Catalyzed.

3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
4. Staining where required: Match approved sample for color.
5. Filled Finish for Open-Grain Woods: After staining, apply wash-coat sealer and allow to dry. Apply paste wood filler and wipe off excess. Tint filler to match stained wood.
6. Sheen: Flat, 15-30 Satin, 31-45 Semigloss, 46-60 Gloss, 61-100 gloss units measured on 60-degree gloss meter in accordance with ASTM D523.

D. Opaque Finish:

1. Sheen: Flat, 15-30 Satin, 31-45 Semigloss, 46-60 Gloss, 61-100 gloss units measured on 60-degree gloss meter in accordance with ASTM D523.

2.16 OPAQUE (PAINTED) FINISH

A. Interior Architectural Woodwork: Wood finish coat(s) as specified in Section 099123 "Interior Painting."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.3 INSTALLATION

A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.

B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.

C. Install interior architectural woodwork level, plumb, true in line, and without distortion.

1. Shim as required with concealed shims.
2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.

1. Secure with countersunk, concealed fasteners and blind nailing.
2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
3. For shop-finished items, use filler matching finish of items being installed.

F. Install standing and running trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.

1. Joints as indicated on Drawings or as approved by Commissioner
2. Do not use pieces less than 24 inches long, except where necessary.
3. Stagger joints in adjacent and related standing and running trim.
4. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
5. Use scarf joints for end-to-end joints.
6. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

7. Install trim after gypsum-board joint finishing operations are completed.
8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

G. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m), 1/4 inch (6 mm) maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.

1. Fasten subtops to cabinets or substrate with screws into corner blocks of base cabinets. Shim as needed to align subtops in a level plane.
2. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

H. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

I. Standing and Running Trim:

1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
2. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

J. Railings:

1. Install rails with no more than 1/8 inch in 96-inch variation from a straight line.
2. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.

    a. Secure with countersunk, concealed fasteners and blind nailing.
    b. Use finishing screws for exposed fastening, countersunk and filled flush with wood surface.

3. Wall Rails: Support rails on wall brackets securely fastened to wall framing.

    a. Space rail brackets not more than 16" o.c.

3.4 CORRECTIVE WORK

A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade.

B. Where not possible to repair, replace defective woodwork.

C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.

1. Fill nail holes with matching filler where exposed.
2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

D. Field Finish: See Section 099123 "Interior Painting" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.5 CLEANING

A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 064023

SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Architectural cabinets; solid wood with plastic-laminate-clad door and drawer faces and edges.
2. Cabinet hardware and accessories.
3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Section 064023 "Interior Architectural Woodwork" for SSM countertops.

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
5. Apply Program label to Shop Drawings.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For the following:

1. Plastic Laminates: 12 by 12 inches, for each type, color, pattern, and surface finish required.

   a. Provide one sample applied to core material with specified edge material applied to one edge.

2. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.7 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product.

1. Composite wood products.
2. High-pressure decorative laminate.
3. Adhesives.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of one typical wall cabinet and one typical base cabinet.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.

B. Architectural Woodwork Standards Grade: Premium.

C. Type of Construction: Frameless.

D. Door and Drawer-Front Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Formica Corporation; Color Core or comparable product by one of the following:

a. Abet Laminati Inc.
b. Pionite; a Panolam Industries International, Inc. brand.
c. Wilsonart LLC.
d. Or approved equal.

F. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Birch or maple veneer plywood.
2. Drawer Sides and Backs: Solid wood.
3. Drawer Bottoms: Thermally fused laminate panels.

G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Commissioner from laminate manufacturer's full range in the following categories:

a. Door and drawer edges: Solid colors with core same color as surface, matte finish.
b. Wood grains, finish.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Particleboard (Medium Density): ANSI A208.1, .

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening.

1. Basis of Design Products: Subject to compliance with requirements, provide Salice; CA-C2-6A99 and CA-C2-6G99 with BARGL/F or comparable product from one of the following:

a. Hafele.
b. Grass.
c. Or approved equal.

C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.

1. Basis of Design Product: Subject to compliance with requirements, provide Hafele, Veranda Collection; Cabinets: 117.05.600, Dishwasher and Refrigerator Drawer: 117.05.640, Refrigerator: 117.05.660 and or comparable product from one of the following:

a. Grass.
b. Blum, Julius & Co., Inc
c. Or approved equal.

2. Wire Pulls: Back mounted, solid metal, size as indicated by selected manufacturers product designation.

D. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.

E. Drawer Slides: ANSI/BHMA A156.9.

1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.

a. Type: Full overtravel extension.
b. Material: Stainless steel slides.
c. Motion Feature: Soft close dampener.

F. Door Locks: ANSI/BHMA A156.11, E07121.

G. Drawer Locks: ANSI/BHMA A156.11, E07041.

H. Bin Waste & Recycling Units:

1. Basis of Design Product: Subject to compliance with requirements, provide Knape & Vogt; USC15-2-50PT with two (2) QT50PB-PP waste bins or comparable product of one the following :

a. Belson Outdoors, LLC.
b. Recycle Away, LLC.
c. Or approved equal.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement or Resorcinol.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Commissioner seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.3 INSTALLATION

A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned.
3. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
4. Complete installation of hardware and accessory items as indicated.
5. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 064216 - FLUSH WOOD PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Flush wood paneling (wood-veneer wall surfacing); fire-retardant-treated.
2. Acoustical wall and ceiling panels with custom perforation pattern as indicated on the Drawings.
3. Installation materials.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing paneling that is concealed within other construction before paneling installation.
2. Section 064023 "Interior Architectural Woodwork."
3. Section 081416 "Flush Wood Doors."

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that paneling can be installed as indicated.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include panel edge, core material, and mounting indicated

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
4. Product Data: For installation adhesives, indicating VOC content.
5. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For flush wood paneling and acoustical wall and ceiling panels.

1. Include plans, elevations, sections, and attachment details.
2. Show details full size.
3. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
4. For paneling veneered in fabrication shop, show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
5. Apply AWI Quality Certification Program label to Shop Drawings.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished paneling.
3. Veneer-Faced Panel Products for Transparent Finish: 12 by 12 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.
4. Acoustic liner panel.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of product.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer Qualifications: Manufacturer meeting the requirements in DDC General Conditions Section 014000 1.7/C/5.

C. Installer Qualifications: Entity approved by manufacturer.

1.9 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of three wall panels and three ceiling panels in location as determined by Commissioner.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver paneling until painting and similar operations that might damage paneling have been completed in installation areas. Store paneling in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.11 FIELD CONDITIONS

A. Environmental Limitations with Humidity Control: Do not deliver or install paneling until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed/concealed by construction and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations: Fabricator to assume undivided responsibility for production of paneling .

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bauerschmidt & Sons.
2. Champion Millwork, Inc.
3. Digifabshop.
4. Four Daughters, LLC.
5. Island Architectural Woodwork, Inc.

6. Legere Goup, Ltd.
7. Miller Blaker, Inc.
8. PGS Millwork, Inc.
9. Or approved equal.

2.3 PANELING, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of flush wood paneling (wood-veneer wall surfacing) indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
2. The Contract Documents may contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.4 FLUSH WOOD PANELING (WOOD-VENEER SURFACING)

A. Grade: Premium.

B. Wood Species and Cut: White oak, rift sliced.

C. Veneer Matching Method:

1. Adjacent Veneer Leaves: Book match.
2. Within Panel Face: Center-balance match.

D. Panel-Matching Method:

1. Made-to-order, sequence-matched panels within each separate area.

E. Panel Core Construction: Fire-retardant fire-retardant MDF.

1. Thickness: 3/4 inch unless otherwise indicated on Drawings.

F. Wood-veneer: Match material specified in Section 081416 "Flush Wood Doors."

G. Exposed Panel Edges: Inset solid-wood or wood-veneer matching faces.

H. Assemble panels by gluing and concealed fastening.

2.5 CUSTOM ACOUSTICAL PANELS

A. Custom Sound-Absorbing Wall and Ceiling Panels: Panel construction consisting of facing material laminated to front face, edges, and back edge border of core.

1. Panel Shape: Flat.

B. Mounting: Back mounted with metal clips or bar hangers or edge mounted with splines, secured to substrate.

C. Core: Mineral-fiber board. Provide wood or plywood nailing strips in core where indicated.

1. Edge Construction: Wood frame, rabbeted, and splined with glued joints and machined corners.
2. Edge Profile: Custom profile as indicated on Drawings.
3. Corner Detail in Elevation: Square with continuous edge profile indicated.
4. Reveals between Panels: As indicated on Drawings.

D. Acoustical Performance: Sound absorption NRC of 0.50 to 0.90 according to ASTM C 423 for Type A mounting according to ASTM E 795.

E. Nominal Overall Panel Thickness: As indicated on Drawings.

F. Panel Width: As indicated on Drawings.

G. Panel Height: As indicated on Drawings.

2.6 MATERIALS

A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.

B. Wood Moisture Content: 5 to 10 percent.

C. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.

1. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.7 ACOUSTIC LINER PANELS

A. Product Description: Boards made of inorganic glass fibers with a thermosetting resin binder and formed into rigid rectangular boards that are dimensionally stable and will not shrink or warp.

1. Acoustical Performance: ASTM C423; Mounting Type A; material placed against solid backing.
2. Density ASTM C303, 3.0 pcf.
3. Surface Burning Characteristics, UL 723; ASTM E84:

a. Flame Spread Index: 25.
b. Smoke Developed Index: 50.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Owens Corning; Select Sound, Black Acoustic Board or comparable product by one of the following:

1. Knauf Insulation; Black Acoustical Smooth Board.
2. Sound Seal; Black Sound Quality Theater Board.
3. Or approved equal.

C. Thickness.1 inch.

2.8 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Use materials with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant Fiberboard: MDF panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index as follows:.

1. Class B; flame-spread index between 26 and 75 and smoke-developed index of 450 or less per ASTM E84, and be listed and labeled by a qualified testing and inspecting agency.

2.9 INSTALLATION MATERIALS

A. Furring (Hanging Strips): Metal Z-shaped non-structural metal framing.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.

C. Installation Adhesive: Product recommended by panel fabricator for each substrate for secure anchorage.

1. VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements.".
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.10 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Complete fabrication, including assembly, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Commissioner seven days in advance of the dates and times paneling fabrication will be complete.

C. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.11 SHOP FINISHING

A. General: Finish paneling at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.

1. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of paneling.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: System - 5, conversion varnish.
3. Staining: Match Commissioner's approved sample.
4. Sheen: 25gloss units measured on 60-degree gloss meter per ASTM D523.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Before installation, condition paneling to humidity conditions in installation areas.

B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.3 INSTALLATION

A. Grade: Install paneling to comply with quality standard grade of paneling to be installed.

B. Install paneling level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.

1. For flush paneling with revealed joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding 1/16 inch.

C. Anchor paneling to supporting substrate with concealed panel-hanger clips (Z-furring).

1. Do not use face fastening unless otherwise indicated.

D. Complete finishing work specified in this Section to extent not completed at shop or before installation of paneling. Fill nail holes with matching filler where exposed.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective paneling, where possible, to eliminate defects. Where not possible to repair, replace paneling. Adjust for uniform appearance.

B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064216

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Sheet waterproofing.
2. Insulation drainage panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

C. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

D. Samples: For each exposed product and for each color and texture specified, including the following products:

1. 4-by-4-inch square of drainage panel.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by waterproofing manufacturer.

C. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

1. Build for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.

a. Size: 100 sq. ft. in area.
b. Description: Each type of wall installation.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.9 WARRANTY

A. Manufacturer's Warranty:

1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

a. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET WATERPROOFING

A. Modified Bituminous Sheet Waterproofing: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits, in accordance with DDC General Conditions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle Coatings & Waterproofing Inc.
b. CETCO, a Minerals Technologies company.
c. GCP Applied Technologies Inc.
d. Henry Company.
e. W.R. Meadows, Inc.
f. Or approved equal.

2. Physical Properties:

a. Tensile Strength, Membrane: 250 psi minimum; ASTM D412, Die C, modified.
b. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D1970/D1970M.
d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C836/C836M.
e. Puncture Resistance: 40 lbf minimum; ASTM E154/E154M.
f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D570.
g. Water Vapor Permeance: 0.05 perm maximum; ASTM E96/E96M, Water Method.

3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.2 ACCESSORIES

A. Furnish accessory materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type accessory materials that comply with VOC limits , in accordance with DDC General Conditions.

B. Primer: Liquid primer recommended for substrate by sheet waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.

2.3 INSULATION DRAINAGE PANELS

A. Insulation: Comply with Section 072100 "Thermal Insulation" for general building insulation, including insulation drainage panels.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.

1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.
3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove concrete fins, ridges, mortar, and other projections.

E. Fill concrete form tie holes, honeycomb, aggregate pockets, holes, and other voids.

F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks in accordance with ASTM D4258.

1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

G. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall joints with overlapping sheet strips of widths according to manufacturer's written instructions.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

H. Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's instructions.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:

a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

I. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.4 INSTALLATION OF SHEET WATERPROOFING

A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

D. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths, to provide a minimum of two thicknesses of sheet membrane over areas to receive waterproofing.

E. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.

F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

G. Seal edges of sheet waterproofing terminations with mastic.

H. Install sheet waterproofing and accessory materials to tie into adjacent waterproofing.

I. Roll waterproofing membrane to firmly adhere to substrate. Roll seams and terminations.

J. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

K. Immediately install protection course with butted joints over waterproofing membrane.

1. Board insulation may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.5 INSTALLATION OF INSULATION DRAINAGE PANELS

A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.

B. Ensure that drainage channels are aligned and free of obstructions.

C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.

D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashing, protection, and drainage components; and to furnish daily reports to Commissioner.

B. Waterproofing will be considered defective if it does not pass inspections.

3.7 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071326

SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Roof Type: 4: Polyurethane waterproofing used as roof membrane under stone paving.
2. Protection course.
3. Molded-sheet drainage panels.

B. Related Requirements:

1. Section 072100 "Thermal Insulation" for general building insulation."
2. Section 321400 "Unit Paving" for stone paver material and installation requirements.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements including, but not limited to, the following:

a. Surface preparation specified in other Sections.
b. Minimum curing period.
c. Forecasted weather conditions.
d. Special details and sheet flashings.
e. Repairs.
f. Field quality control.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:

1. Indicate locations and extent of waterproofing.
2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Samples: For each exposed product and for each color and texture specified, including the following products:

1. Flashing sheet, 8 by 8 inches.
2. Membrane-reinforcing fabric, 8 by 8 inches.
3. Drainage panel, 4 by 4 inches.

D. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality-control reports.

C. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by waterproofing manufacturer.

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

1. Build mockup for each typical waterproofing installation, including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.

a. Size: 100 sq. ft. in area.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.

1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
2. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.10 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 POLYURETHANE WATERPROOFING

A. Two-Component, Reinforced, Polyurethane Waterproofing: ASTM C836/C836M.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Kemper System, Inc. Kemperol "2K-PUR"
b. Siplast; "Parapro."
c. Soprema, Inc.; “Alsan RS.”.
d. Or approved equal.

2.2 AUXILIARY MATERIALS

A. General: Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits, in accordance with DDC General Conditions.

B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated.

C. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric, manufacturer's standard weight.

D. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.

E. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; as specified in Section 079200 "Joint Sealants"; and as recommended by manufacturer for substrate and joint conditions.

1. Backer Rod: Closed-cell polyethylene foam.

2.3 PROTECTION COURSE

A. Protection Course, Core or Extruded-Polystyrene Board Insulation, One Side or Both Sides with Plastic Film: Fan folded, nominal thickness of 1/4 inch, with compressive strength of not less than 8 psi in accordance with ASTM C1621/C1621M and maximum water absorption by volume of 0.6 percent in accordance with ASTM C272/C272M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Chemical Company (The).
b. Kingspan Insulation Limited.
c. Owens Corning.
d. Or approved equal.

2.4 MOLDED-SHEET DRAINAGE PANELS

A. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panels consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 sieve, laminated to one side of the core, without a polymeric film bonded to the other side; and with a horizontal flow rate through the core of not less than 2.8 gpm per ft..

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Hydrotech, Inc.
b. Carlisle Coatings & Waterproofing Inc.
c. CETCO, a Minerals Technologies company.
d. Soprema, Inc.
e. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.

1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate in accordance with ASTM D4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces in accordance with ASTM D4258.

E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.4 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M.

B. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

3.5 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M. Before coating surfaces, remove dust and dirt from joints and cracks in accordance with ASTM D4258.

1. Comply with ASTM C1193 for joint-sealant installation.
2. Apply bond breaker on sealant surface, beneath preparation strip.
3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least 6 inches wide along each side of joint. Apply waterproofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.

B. Install sheet flashing and bond to deck and wall substrates where required in accordance with waterproofing manufacturer's written instructions.

1. Extend sheet flashings for 4 inches onto perpendicular surfaces and items penetrating substrate.

3.6 INSTALLATION OF WATERPROOFING

A. Apply waterproofing in accordance with manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M.

B. Start installing waterproofing in presence of manufacturer's technical representative.

C. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.

D. Reinforced Waterproofing Applications: Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other suitable application method.

1. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases and pinholes, with an average dry film total thickness of 120 mils.
2. Apply reinforced waterproofing to prepared wall terminations and vertical surfaces.
3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft..

E. Cure waterproofing, taking care to prevent contamination and damage during application and curing.

F. Install protection course with butted joints over waterproofing before starting subsequent construction operations.

1. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.

3.7 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, in accordance with manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashing, protection, and drainage components and to furnish daily reports to Commissioner.

B. Waterproofing will be considered defective if it does not pass inspections.

C. Prepare inspection reports.

3.9 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION 071416

SECTION 071613 - POLYMER MODIFIED CEMENT WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Prepackaged, polymer-modified cement waterproofing over masonry substrate.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and installation instructions.

B. Sustainable Design Submittals:

1. Product Data: For coatings, indicating VOC content.
2. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.

C. Samples for Verification: For each type of waterproofing indicated, in manufacturer's standard sizes.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Applicator.

B. Product Certificates: For each type of waterproofing, patching, and plugging material.

C. Product Test Reports: For each product formulation, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer Qualifications: Manufacturer meeting the requirements in DDC General Conditions Section 014000 1.7/C/5.

C. Applicator Qualifications: A firm experienced in applying polymer-modified cement waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers properly trained and approved by manufacturer.

1.7 FIELD CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit polymer-modified cement waterproofing to be performed in accordance with manufacturer's written instructions.

B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg For above during work and cure period, and space is well ventilated and kept free of water.

PART 2 - PRODUCTS

2.1 PREPACKAGED, POLYMER-MODIFIED CEMENT WATERPROOFING

A. Negative-Side, Polymer-Modified Cement Waterproofing: Manufacturer's blend of dry cementitious and other ingredients for mixing to produce a waterproof coating that is suitable for vertical and horizontal applications below or above grade, is breathable, resists negative-side hydrostatic pressure, and has properties complying with or exceeding the criteria specified below.

1. Product: Subject to compliance with requirements, provide one of the following:

    a. ChemMasters; Chemseal.
    b. Master Builders Solutions; MasterSeal 581.
    c. Henry Company; Stone Mason U-Seal.
    d. Or approved equal.

2. Permeability: As indicated by selected manufacturers product designation.
3. Flexural Strength: As indicated by selected manufacturers product designation; minimum at 28 days when tested in accordance with ASTM C 348.
4. Bond Strength: As indicated by selected manufacturers product designation.

5. Color: As selected by Commissioner from full range.
6. VOC Content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements." .
7. Low-Emitting Materials: Interior coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ACCESSORY MATERIALS

A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections and compatible with substrate and other materials indicated.

B. Water: Potable.

2.3 MIXES

A. Prepackaged, Polymer-Modified Cement Waterproofing: Add prepackaged dry ingredients to mixing liquid according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.

B. Proceed with application only after unsatisfactory conditions have been corrected.

C. Notify Commissioner in writing of active leaks or defects that would affect system performance.

3.3 PREPARATION

A. Comply with manufacturer's written instructions.

B. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to ensure adequate ambient temperatures and ventilation conditions for application.

C. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.

D. Stop active water leaks with plugging compound.

E. Repair damaged or unsatisfactory substrate with patching compound.

1. At holes and cracks 1/16 inch wide or larger in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and minimum 1 inch deep. Fill reveal with patching compound flush with surface.

F. Surface Preparation: Remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.

1. Clean concrete unit masonry surfaces in accordance with ASTM D 4261.

a. Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
b. Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of 1/16 inch.

2. Concrete Joints: Clean reveals.

3.4 APPLICATION

A. General: Comply with waterproofing manufacturer's written instructions for application and curing.

1. Saturate surface with water and maintain damp condition until applying waterproofing. Remove standing water.

B. Final Coat Finish: Brushed.

END OF SECTION 071613

SECTION 071616 - CRYSTALLINE WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Crystalline waterproofing at interior surfaces of elevator pit, detention tank, and ejector pit.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and installation instructions.

B. Sustainable Design Submittals.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Applicator.

B. Product Certificates: For each type of waterproofing, patching, and plugging material.

C. Product Test Reports: For each product formulation, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer Qualifications: Manufacturer meeting the requirements in DDC General Conditions Section 014000 1.7/C/5.

C. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers properly trained and approved by manufacturer.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.

B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F or above during work and cure period, and space is well ventilated and kept free of water.

PART 2 - PRODUCTS

2.1 WATERPROOFING MATERIALS

A. Crystalline Waterproofing: Prepackaged, gray white-colored blend of Portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; with properties complying with or exceeding the criteria specified below.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anti-Hydro International, Inc.
   b. AQUAFIN, Inc.
   c. Euclid Chemical Company (The); an RPM company.
   d. Kryton International Inc.
   e. Xypex Chemical Corporation.
   f. Or approved equal.

2. Water Permeability: Maximum zero for water at 30 feet when tested in accordance with COE CRD-C 48.

2.2 ACCESSORY MATERIALS

A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; and compatible with substrate and other materials indicated.

B. Water: Potable.

2.3 MIXES

A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.

B. Proceed with application only after unsatisfactory conditions have been corrected.

C. Notify Commissioner in writing of active leaks or defects that would affect system performance.

3.3 PREPARATION

A. Comply with manufacturer's written instructions.

B. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to ensure adequate ambient temperatures and ventilation conditions for application.

C. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.

D. Stop active water leaks with plugging compound.

E. Repair damaged or unsatisfactory substrate with patching compound.

1. At holes and cracks 1/16 inch wide or larger in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and minimum 1 inch deep. Fill reveal with patching compound flush with surface.

F. Surface Preparation: Remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.

1. Clean concrete surfaces in accordance with ASTM D4258.

   a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic acid solution in accordance with ASTM D4260.
   b. Smooth-Formed and Trowel-Finished Concrete: Prepare by mechanical abrading or abrasive-blast cleaning in accordance with ASTM D4259.

2. Clean concrete unit masonry surfaces in accordance with ASTM D4261.

   a. Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
   b. Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of 1/16 inch.

3. Concrete Joints: Clean reveals.

3.4 INSTALLATION

A. Comply with waterproofing manufacturer's written instructions for application and curing.

1. Saturate surface with water for several hours and maintain damp condition until applying waterproofing. Remove standing water.
2. Apply waterproofing to surfaces, and extend waterproofing onto adjacent surfaces as follows:

   a. Onto interior nontreated walls intersecting exterior treated walls, for a distance of 24 inches for cast-in-place concrete and 48 inches for masonry.
   b. Onto every substrate in areas indicated for treatment.

3. Number of Coats: Number required for specified water permeability.
4. Application Method: Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
5. Dampen surface between coats.

B. Final Coat Finish: Smooth or Spray textured.

C. Curing: Moist-cure waterproofing for three days immediately after final coat has set, followed by air drying, unless otherwise recommended in writing by manufacturer.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed application of waterproofing.

B. Prepare inspection reports.

END OF SECTION 071616

SECTION 071700 - BENTONITE WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Composite polyethylene/bentonite membrane.

B. Related Requirements:

1. Section 071416 "Cold Fluid-appled Waterproofing" for molded-sheet drainage panels
2. Section 072100 Thermal insulation" for other insulation materials.
3. Section 310000 "Earthwork" for excavating and backfilling.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and installation instructions.

B. Shop Drawings: Include installation details for waterproofing, penetrations, and interface with other work.

C. Samples: For each of the following products, in sizes indicated:

1. Waterproofing: 6 inches square.
2. Protection Course: 6 inches square.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of waterproofing material.

C. Field quality-control reports.

D. Sample Warranty: For manufacturer's special warranty.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by waterproofing manufacturer.

C. Mockups: Build mockups to set quality standards for fabrication and installation.

1. Build mockup of installation on typical vertical surfaces 100 sq. ft. in size.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit bentonite waterproofing to be installed according to manufacturer's written instructions and warranty requirements.

1. Do not apply waterproofing materials to surfaces where ice or frost is visible. Do not apply bentonite waterproofing materials in areas with standing water.
2. Do not place bentonite clay products in panel or composite form on damp surfaces unless such practice is approved in writing by manufacturer.

1.9 WARRANTY

A. Warranty: Manufacturer agree(s) to repair or replace components of bentonite waterproofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COMPOSITE POLYETHYLENE/BENTONITE MEMBRANE

A. Composite Polyethylene/Bentonite Membrane with Protective Facing: Minimum 170-mil- thick membrane consisting of polyethylene geomembrane bonded to a layer of bentonite and with a protective, nonwoven-geotextile facing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CETCO.
b. Mar-flex Waterproofing & Building Products.
c. Tremco Commercial Sealants & Waterproofing.
d. Or approved equal.

2. Puncture Resistance: 130 lbf in accordance with ASTM D4833 or 169 lbf in accordance with ASTM E154.
3. Vapor Permeance: 0.03 perm in accordance with ASTM E96/E96M.

2.2 PROTECTION COURSE

A. Protection mat of type and thickness as recommended in writing by waterproofing manufacturer for each Project condition.

1. Adhesive: As recommended in writing by waterproofing manufacturer.

2.3 ACCESSORIES

A. Termination Bar: Extruded-aluminum or formed-stainless-steel bars with upper flange to receive sealant.

B. Cement Grout Patching Material: Grout mix compatible with substrate being patched and recommended in writing by waterproofing manufacturer.

C. Sealants: As recommended in writing by waterproofing manufacturer. Comply with requirements specified in Section 079200 "Joint Sealants."

D. Tapes: Waterproofing manufacturer's recommended waterproof tape for joints between sheets, membranes, or panels.

E. Adhesive: Waterproofing manufacturer's water-based adhesive used to secure waterproofing to both vertical and horizontal surfaces.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations and other conditions affecting performance of bentonite waterproofing.

B. Examine bentonite materials before installation. Reject materials that have been prematurely exposed to moisture.

C. Verify that substrate is complete and that work that will penetrate waterproofing is complete and rigidly installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions.

B. Formed Concrete Surfaces: Remove fins and projections. Fill voids, rock pockets, form-tie holes, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.

C. Excavation Support and Protection System: If water is seeping, use plastic protection sheets or other suitable means to prevent wetting the bentonite waterproofing. Fill minor gaps and spaces 1/8 inch wide or wider with wood, metal, concrete, or other appropriate filling material. Cover or fill large voids and crevices with cement mortar according to manufacturer's written instructions.

3.4 INSTALLATION, GENERAL

A. Prepare substrates, voids, cracks, and cavities; and install waterproofing and accessories according to manufacturer's written instructions.

1. Before installing, verify the correct side of waterproofing that faces substrate surface.
2. Apply granular bentonite around penetrations in horizontal surfaces and changes in plane according to manufacturer's details in preparation for bentonite tubes and mastic.
3. Apply bentonite tubes, bentonite mastic, or both at changes of plane, construction joints in substrate, projections, and penetrations.
4. Prime concrete substrates. Primer may be omitted on concrete surfaces that comply with manufacturer's written requirements for dryness, surface texture, and freedom from imperfections.

B. Apply bentonite tubes continuously on footing against base of wall to be waterproofed.

C. Protect waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures, tears, and cuts.

D. Install protection course before backfilling or placing overburden when recommended in writing by waterproofing manufacturer.

3.5 INSTALLATION OF COMPOSITE POLYETHYLENE/BENTONITE MEMBRANE

A. Install a continuous layer of waterproofing membrane, with ends and edges lapped a minimum of 4 inches unless otherwise indicated. Stagger end joints between membranes a minimum of 24 inches. Seal joints with permanent seam tape.

B. Concrete Walls: Apply mastic to form continuous 3/4-inch cant or fillet at intersection of footings and walls.

1. Starting at lowest point, install a layer of waterproofing membrane horizontally, extending a minimum of 6 inches onto the footing. Lap membrane ends and edges a minimum of 2 inches.
2. Secure membrane to wall.
3. Apply mastic to form continuous 3/4-inch layer around penetrations.
4. Termination at Grade: Extend waterproofing membrane to within 12 inches of finish grade unless otherwise indicated. Secure top edge with termination bar. Apply sealant to top edge of termination bar.

C. Excavation Support and Protection (Permanent Shoring): Cut, clean, and treat tiebacks and similar projections. Encase tieback heads, rods, nuts, and plates according to waterproofing manufacturer's written instructions for each configuration. If water is present, cover shoring and lagging with plastic protection sheets; remove plastic sheets before placing concrete.

1. Starting at lowest point, install a layer of waterproofing membrane, with ends and edges lapped minimum of 4 inches and nailed to shoring.
2. Inspect and repair waterproofing membrane after reinforcing steel has been placed. Coordinate and control concrete placement to avoid damage to waterproofing.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed waterproofing installation before covering with other construction, and provide written report stating that installation complies with manufacturer's written instructions.

1. Remove and replace applications of bentonite waterproofing where inspection indicates that it does not comply with specified requirements.

END OF SECTION 071700

SECTION 072010 - WALL FRAMING SUPPORT SYSTEM FOR CONTINUOUS INSULATION (CI)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Continuous insulation (CI) framing support system(CFS) for insulated wall assembly integrated with exterior finish system(s) indicated on drawings.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for brick veneer cladding.
2. Section 054000 "Cold-Formed Metal Framing" for metal stud support framing.
3. Section 061600 "Sheathing" for exterior gypsum sheathing.
4. Section 074213.16 "Metal Plate Wall Panels" cladding and fascia.
5. Section 072726 "Fluid-applied Membrane Air Barriers" for air, water, vapor barrier over exterior sheathing.
6. Section 079200 "Joint Sealants."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Attendance: Contractor, Commissioner, Manufacturer, and Installer.
2. Review: Manufacturer's written instructions.

    a. Installation methods for frame components attaching to supporting construction.
    b. Installation of air barrier.
    c. Installation and adjusting of CFS System.
    d. Coordination with other work.

3. Examine support conditions for compliance with requirements, including alignment and attachment to structural support system.
4. Review flashings, wall cladding details, wall penetrations, openings, and condition of other construction that affects this Work.
5. Review temporary protection requirements for during and after installation of this Work. Review and finalize construction schedule.

6. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: Submit for each type of product indicated; include construction details, material descriptions, dimensions of individual components and profiles, and accessories as necessary for complete fully functioning and assembled system.

1.6 INFORMATIONAL SUBMITTALS

A. Test and Inspection Reports: Submit test and inspection reports on each type of wall cladding/veneer system based on evaluation of comprehensive tests performed by nationally recognized testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer Qualifications: Manufacturer meeting the requirements in DDC General Conditions Section 014000 1.7/C/5.

1.8 |DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer’s original unopened containers and packaging with labels clearly identifying product name and manufacturer.

B. Deliver components and other manufactured items or accessories without damage or deformation.

C. Storage: Store materials in clean, dry, and level interior areas or outdoor areas for limited duration in accordance with manufacturer’s written instructions.

D. Protect components and auxiliary accessories during transportation, handling, and installation from moisture, excessive temperatures and other construction operations in accordance with manufacturer’s written instructions.

E. Handle components in strict compliance with manufacturer’s written instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface, edge or corner damage.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work in accordance with manufacturer's written installation instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate construction of cladding support system over substrate indicated for proper drainage, flashing, trim, back-up support, and related Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural: Measure the performance of the factory formed joints using a minimum of 30 psf (ASTM E72).

B. System Thermal Design: Ensure installed CFS system, opening trim, subframing, clips and cladding attachment does not have thermal bridging of fasteners or framing that creates a continuous metal path from exterior surface of insulation to interior face of insulation.

1. System thermal design shall meet or exceed thermal design requirements in compliance with ASHRAE 90.1 and the 2015 NYS Energy Conservation Code.
2. Thermal Resistance: Wall assembly R-vlue of 13 (CI).
3. Thermal Performance Test: Provide thermal resistance (R-value) indicated, in compliance with ASTM C1363, corrected to 15 mph outside and still air inside, with installed conditions including trim for openings, fastening and joints.

    a. Provide efficiency of no less than 98 percent, with a maximum temperature differential of 18 degrees F from interior wall surface to interior wall cavity and node locations with a 70 degrees F exterior to interior wall temperature delta.
    b. Provide test unit with at least one insulation panel horizontal and vertical joint length and height of test chamber area.
    c. Provide finite element analysis of three-dimensional simulation of described wall assembly sealed by professional engineer in compliance with performance requirements and exceeding it by at least 3 percent.

C. Temperature: Comply with structural loading requirements within temperature range of minus 55 degrees F to 180 degrees F.

D. Fire-Test-Response Characteristics: Provide composite framing support system with fire-test results indicated as determined by test standard indicated and applied by UL or other testing and inspection agency acceptable to Commissioner.

1. Surface Burning Characteristics: In compliance with ASTM E84, for foam insulation, steel fiber reinforced polymer (SFRP) and interior surfaces as follows:

    a. Flame Spread Index: 25 or less.
    b. Smoke Developed Index: 450 or less.

2. Intermediate Scale Multistory Fire Test: Comply with NFPA 285 and the Building Code of the City of New York for wall height above grade and fire separation distances, when wall type and other noted conditions require such testing or compliance with requirements as indicated.
3. Self-Extinguishing: Comply with ASTM D635.

2.2 COMPOSITE FRAMING SUPPORT (CFS) SYSTEM

A. Description: CFS system components anchored to substrate indicated.

1. Manufacturers: Subject to compliance with requirements, provide one of the following:

    a. AAP/ Advanced Architectural Products; SMARTci GreenGirt or GreenGirt Clips and SMARTci Trim.
    b. Strongwell; Strongirt.
    c. Knight Wall Systems; Thermazee.
    d. Armatherm; Z-girts.
    e. Or approved equal.

B. CFS System: System must consist of polyester and vinyl ester bioresin matrix (FRP) with recycled materials, fire retardant additives and integral continuous metal inserts the length of profile. Reinforce CFS system with glass strand rovings used internally for longitudinal (lengthwise) strength and continuous strand glass mats or stitched reinforcements used internally for transverse (crosswise) strength.

1. Steel and fiber-reinforced polymer (sFRP) Z-Girt where required to eliminate thermal bridging.

    a. Depth: As indicated on drawings.
    b. Configuration: As indicated on drawings.
    c. On Center Spacing: 16 inch unless otherwise indicated.

2. Provide continuous non-corrosive steel insert for engagement of fasteners, 16 gage, minimum thickness, with G90 galvanized coating designation in compliance with ASTM A653/A653M.

    a. Fully engage steel insert with adjacent CFS at ends.
    b. Anchor sub-girts and other wall cladding support accessories to steel insert set into and part of CFS.

3. Provide integral 3-point compression seal in CFS sections to ensure insulation panel will not dislodge.
4. Provide integral anti-siphon grooves on exterior and interior flanges of CFS.
5. Provide force distribution zones integrally designed into profile of CFS.
6. Provide spline seals for adjacent insulation units into profile of CFS.
7. Profile Visual Requirements: Comply with ASTM D4385.

8. Tensile Stress: Provide engineered lengthwise and crosswise tensile stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D638.
9. Compressive Stress: Provide engineered lengthwise and crosswise compressive stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D695.
10. Flexural Stress: Provide engineered lengthwise and crosswise flexural stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D790.
11. Modulus of Elasticity: Engineered to meet performance loading criteria and specified safety factors.
12. Barcol Hardness: 45, in accordance with ASTM D2583.
13. Density: Within range of 0.062 to 0.070 lbs/cubic inch, in accordance with ASTM D792.
14. Lengthwise Coefficient of Thermal Expansion: 7.0 x 10^{-6} inch/inch/degrees F, in accordance with ASTM D696.
15. Notched Izod Impact, Lengthwise: 24 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.
16. Notched Izod Impact, Crosswise: 4 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.

C. Composite Trim: Provide composite trim at rough openings to properly transition CI system.

1. Use trim angles and accessories sized to enclose CI system to provide thermally broken transition from opaque wall assemblies.
2. Use sealant and tapes as required to transition vapor barrier from substrate onto trim.
3. Trim to provide 90 degree transition of continuous insulated substrate for vapor barrier and exterior flashings.

2.3 INSULATION

A. Mineral-Wool Board Insulation: Refer to Section 072100 "Thermal Insulation."

B. Provide factory formed edges on insulation panels that interlock with CFS system components.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Fasteners need to be of the type and size recommended by framing manufacturer for the intended use and the building enclosure loading.

B. Thermal Isolating Washers, where required: Minimum 0.125-inch-thick Polyoxymethylene copolymer (POM) washers with integral centering lip to act as a thermal break between wall anchor fastener and girt.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrate, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, supports, and other conditions affecting performance of the Work.

3.3 INSTALLATION

A. Install CFS system components vertically on substrate system unless otherwise indicated with shims as indicated on drawings in compliance with specified requirements.

END OF SECTION 072010

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Mineral-wool blanket insulation.
3. Mineral-wool board insulation.
4. Structural thermal break materials.
5. Polyurethane foam insulation.
6. Loose-fill insulation.
7. Spray-applied cellulosic insulation.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Extruded polystyrene foam-plastic board insulation.
2. Mineral-wool blanket insulation.
3. Mineral-wool board insulation.
4. Structural thermal break materials.
5. Polyurethane foam insulation.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Data: For adhesives, indicating VOC content.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.

5. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.
6. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For load-bearing insulating materials.

1. Show locations and extent of materials, accessories, and assemblies specific to Project conditions.
2. Include details of interfaces with other materials .

1.5 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. For sprayed insulation, indicate initial installed thickness, settled thickness, settled R-value, installed density, coverage area, and number of bags installed.
2. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type VII : ASTM C578, Type VII, 60-psi minimum compressive strength; unfaced.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dow Chemical Company (The).
    b. Kingspan Insulation Limited.
    c. Owens Corning.
    d. Or approved equal.

2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
4. Thermal Resistance: R-5 per inch minimum.
5. Labeling: Where Installer's Certification is not provided, include identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
6. Uses: Under stone pavers.

2.2 MINERAL-WOOL BLANKET INSULATION

A. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Rockwool International.
    c. Thermafiber, Inc.; an Owens Corning company.
    d. Or approved equal.

2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.

2.3 MINERAL-WOOL BOARD INSULATION

A. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Semi-Rigid Mineral (Stone)- Wool Board Insulation, Unfaced: ASTM C612, Type IVB Compliant and passing ASTM 136 (CAN/ULC S114) for combustion characteristics.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ROCKWOOL; Cavityrock or comparable product by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Thermafiber, Inc.; an Owens Corning company.
    c. Or approved equal.

2. Nominal Density: Greater than 4.3 lb/cu. ft.
3. Flame-Spread Index: 0 when tested in accordance with ASTM E84 (UL 723).
4. Smoke-Developed Index: 0 when tested in accordance with ASTM E84 (UL 723).
5. Thermal Resistance: R-value / inch @ 75 degrees F: 4.2 hr.ft2.F/Btu in accordance with ASTM C518 (C177).
6. Labeling: Where Installer's Certification is not provided, provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

C. Rigid Mineral (Stone)-Wool Board Insulation, Unfaced: ASTM C612, Types Type IVB and I Compliant and passing CAN/ULC S114 for combustion characteristics..

1. Basis-of-Design Product: Subject to compliance with requirements, provide ROCKWOOL; Comfortboard 80 or comparable product by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. Thermafiber, Inc.; an Owens Corning company.
   c. Or approved equal.

2. Nominal Density: 8 lb/cu. ft.
3. Flame-Spread Index: 0 when tested in accordance with ASTM E84 (UL 723).
4. Smoke-Developed Index: 0 when tested in accordance with ASTM E84 (UL 723).
5. Thermal Resistance: R-value / inch @ 75 degrees F: 4.2 hr.ft2.F/Btu in accordance with ASTM C518 (C177).
6. Labeling: Where Installer's Certification is not provided, provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.4 STRUCTURAL THERMAL BREAK MATERIALS

A. Load-bearing insulating materials: Materials are high strength, thermoset polyurethane, high density speciality products, and aerogel insulating strips.

B. Product: Subject to compliance with requirements, provide one or more of the following as indicated and required by project application:

1. Armatherm 500; Contact: Michael Wicker, Integrated Vertical Solutions, T: 315-399-4035, mike@ivs-newyork.com.
2. FoamGlas Perinsul HL (High Load); Contact: Marc Napolitano, IMC/ Insulation Materials Corporation, T: 908-753-0220, marcn@imcinsulation.com.
3. Thermoblock; Contact: Rob Haley, Thermal Bridging Solutions, T: 888-401-0527, sales@thermalbridgingsolutions.com.
4. Or approved equal.

C. Thermal Resistance: R2.2 per inch minimum.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space between face of insulation and substrate to which anchor is attached.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

2.6 POLYURETHANE FOAM INSULATION

A. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Polyurethane Pour-In-Place Insulation: Closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84, specifically formulated for pour-in-place applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle Construction Materials; Carlisle Spray Foam Insulation.
b. Huntsman Building Solutions (HBS).
c. NCFI Polyurethanes; a division of Barnhardt Manufacturing Company.
d. Or approved equal.

2.7 ACCESSORIES

A. Mechanical Fasteners for attaching Mineral Wool Board Insulation: Product and spacing approved by insulation manufacturer.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

1. VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."

2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.4 INSTALLATION OF SLAB INSULATION

A. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.5 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions.
2. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
3. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
4. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
5. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.6 INSTALLATION OF CAVITY-WALL INSULATION

A. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.

1. Fit courses of insulation between masonry wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.

3.7 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

B. Miscellaneous Voids and where indicated on drawings: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.8 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching glass.
2. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
3. Install insulation to fit snugly without bowing.

3.9 STRUCTURAL THERMAL BREAK MATERIALS

A. Install load-bearing insulating materials in accordance with approved shop drawings and manufacturer's written instructions.

3.10 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072600 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Vapor barriers under concrete slab- on- grade over prepared substrate.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer’s product data, recommendations and installation instructions for vapor barrier materials required.

B. Shop Drawings: Include project specific details indicating edge terminations, splices, penetrations, inside and outside corners, and adjoining conditions.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 UNDER SLAB VAPOR BARRIERS

A. Product Description: 20-mil thick vapor barrier that is a multi-layer plastic extrusion manufactured with highest grade of prime, virgin, polyolefin resins.

1. Water Vapor Barrier: ASTM E-1745, meets or exceeds Class A.
2. Permeance: Less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745, Section 7.1 (7.1.1-7.1.5).

B. Basis-of-Design Product: Subject to compliance with requirements, provide Stego Industries LLC.; Stego Wrap (20 mil) or comparable product from one of the following:

1. Fortifier Building Products Systems
2. Raven Industries Inc.
3. Reef Industries.
4. Or approved equal.

2.2 ACCESSORIES

A. Mastic: Liquid-applied vapor retardant membrane of type recommended by vapor-retarder manufacturer.

B. Seam Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Prefabricated Pipe Boot: Provide manufacturer’s prefabricated pipe boot and clamp for installation at penetrations through slab.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean substrate of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.3 UNDER SLAB VAPOR BARRIER INSTALLATION

A. Place vapor retarders on side of construction indicated on Drawings.

B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

1. Cover with vapor-barrier tape or another layer of vapor barrier.

3.4 PROTECTION

A. Protect installed vapor retarders from damage until concealed by permanent construction.

B. Provide temporary coverings or enclosures where vapor barrier is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation

END OF SECTION 072600

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Vapor-permeable, fluid-applied air barriers.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

B. Sustainable Design Submittals:

1. Product Data: For coatings, indicating VOC content.
2. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

D. Field quality-control reports.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by manufacturer.

C. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly as indicated on Drawings, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

    a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
    b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
    c. If Commissioner determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

B. VOC Content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."

C. Low-Emitting Materials: Products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E2357.

2.3 HIGH-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. High-Build, Vapor-Permeable Air Barrier, Synthetic Polymer Type: Synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils or thicker over smooth, void-free substrates.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Applied Technologies Inc.; Perm-A-Barrier VPL or comparable product by one of the following:

a. Henry Company.
b. Tremco Incorporated.

c. Or approved equal.

B. Physical and Performance Properties:

1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.4 MEDIUM-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Medium-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 17 to 30 mils over smooth, void-free substrates.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle Coatings & Waterproofing Inc.; Fire Resist Barritech NP or comparable product by one of the following:

a. Hohmann & Barnard, Inc.
b. W.R. Meadows, Inc.
c. Or approved equal.

2. Physical and Performance Properties:

a. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.5 ACCESSORY MATERIALS

A. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates are visibly dry and free of moisture.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge isolation joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.4 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, transition strip.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.

C. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.

D. Do not cover air barrier until it has been tested and inspected by testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.

C. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, chamber pressurization or depressurization with smoke tracers.
2. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each 600 sq. ft. of installed air barrier or part thereof.

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

F. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 074213.16 - METAL PLATE WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes metal plate wall panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Commissioner, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review temporary protection requirements for metal panel assembly during and after installation.
7. Review procedures for repair of metal panels damaged after installation.
8. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage, at a scale of not less than 3 inches per 12 inches.

D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, tests performed by a qualified testing agency.

B. Field quality-control reports.

C. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by manufacturer.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical metal panel assembly , including corner, supports, attachments, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 330:

1. Wind Loads: As indicated on Structural Drawings.
2. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL PLATE WALL PANELS

A. Metal Plate Wall Panels: Provide factory-formed, metal plate wall panels fabricated from single sheets of metal formed into profile for installation method indicated. Include attachment assembly components, and accessories required for weathertight system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Metalwerks.
b. Pohl.
c. Sobotec.
d. Protean Construction Products, Inc.
e. Or approved equal.

B. Panel Depth: As indicated on Drawings.

C. Aluminum Sheet: Tension-leveled, smooth aluminum sheet, ASTM B 209, 0.125 inch thick.

1. Exterior Finish: Three-coat fluoropolymer.

a. Basis-of-Design Color Product: Subject to compliance with requirements, provide Akzo Nobel; Tri-escent II Ultra CKM2C31050 with Primer CKA1C22454 or comparable product by one of the following:.

1) PPG Pittsburgh Paints (PPG Industries).
2) Sherwin Williams (Valspar).
3) Or approved equal.

D. Attachment Assembly: Rainscreen-principle system. Refer to Section 074210.11 "Wall Framing Support System for Continuous Insulation (CI)" for requirements.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

1. Refer to Section 076200 “Sheet Metal Flashing and Trim.”

D. Panel Fasteners: Self-tapping screws, countersunk tamper-proof type, designed to withstand design loads. Fasteners shall not be exposed unless required by the Contract Documents. Where exposed fasteners are allowed, provide with heads matching color of metal panels by factory-applied coating.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.4 INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners unless otherwise indicated. Refer to para. 2.3D for material.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support metal plate wall panels including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Installation: Attach metal plate wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.

1. Rainscreen Systems: Do not apply sealants to joints unless otherwise indicated.

F. Rainscreen-Principle Installation: Install using manufacturer's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal plate wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.

1. Install metal plate wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
2. Do not apply sealants to joints unless otherwise indicated.

G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.

H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal plate wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal wall panel installation, including accessories.

B. Remove and replace metal wall panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.16

SECTION 075423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Roof Types: 1 & 3: Adhered thermoplastic polyolefin (TPO) roofing system.
2. Accessory roofing materials.
3. Vapor retarder.
4. Roof insulation, mechanically fastened where required.
5. Insulation accessories and cover board.
6. Electronic leak detection (ELD) materials.
7. Walkways.

B. Related Requirements:

1. Section 077273 "Vegetated Roof Systems" for overburden requirements.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 COORDINATION

A. Coordinate roof installation with Section 077273 "Vegetated Roof Systems."

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Commissioner, testing and inspecting agency representative if applicable, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review temporary protection requirements for roofing system during and after installation.
8. Review roof observation and repair procedures after roofing installation.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Sustainable Design Submittals:

1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
4. Environmental Product Declaration: For each product.
5. Health Product Declaration: For each product.
6. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane termination details.
3. Flashing details at penetrations.
4. Insulation fastening where used, patterns for corner, perimeter, and field-of-roof locations.
5. Tie-in with adjoining air barrier.

D. Samples for Verification: For the following products:

1. Roof membrane and flashings, of color required.
2. Walkway pads or rolls, of color required.

E. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of compliance with performance requirements.

2. Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for warranty.

C. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

D. Field Test Reports:

1. Concrete internal relative humidity test reports.
2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

E. Field quality-control reports.

F. Sample Warranties: For manufacturer's warranties.

1.9 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.10 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installers Qualifications: A qualified firm that is eligible to receive manufacturer's special warranty.

1. Installer must be an entity meeting requirements of DDC General Conditions Section 014000 article 1.7.C.3.
2. Provide full-time supervisor/foreman with experience on projects of similar type and scope, on-site while the work is in progress.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.12 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.13 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty includes roof membrane, base flashings, roof insulation, fasteners, vapor retarder, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and flashings to withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings to remain watertight.

1. Accelerated Weathering: Roof to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roof membrane to resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Roofing materials to be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Roof Area Field: As indicated on Structural Drawings .

D. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

E. ENERGY STAR Listing: Roofing system to be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low -slope roof products.

F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced for Roof Type 3 and fabric-backed for Roof Type 1 (Vegetated Roof Assembly).

1. Basis-of-Design Product: Subject to compliance with requirements, provide roofing membrane products as supplied by Carlisle SynTec Incorporated or comparable product by one of the following:

   a. Firestone Building Products.
   b. GAF.
   c. Johns Manville; a Berkshire Hathaway company.
   d. Versico Roofing Systems.
   e. Or approved equal.

2. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.
3. Thickness: 60 mils, nominal.
4. Exposed Face Color: Gray or White, as selected by Commissioner.

2.3 ACCESSORY ROOFING MATERIALS

A. General: Accessory materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. VOC content for Adhesives and Sealants: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."
2. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.

C. Bonding Adhesive: Manufacturer's standard, water based.

D. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

E. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 VAPOR RETARDER

A. Rubberized-Asphalt-Sheet Vapor Retarder, Self-Adhering: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roof membrane manufacturer.

B. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV, 1.45-lb/cu. ft. minimum density, 25 psi minimum compressive strength except at Vegetated Roof Type VI, 1.8-lb/cu. ft., minimum density, 40 psi minimum compressive strength, square edged.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dow Chemical Company (The).
    b. Kingspan Insulation Limited.
    c. Owens Corning.
    d. Or approved equal.

2. Thermal Resistance: R-value of 5.0 per 1 inch.
3. Size: 48 by 48 inches or 48 by 96 inches.
4. Thickness:

    a. Base Layer: 1-1/2 inches.
    b. Upper Layer: As required to achieve required R-value of 40.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.

2.6 INSULATION ACCESSORIES AND COVER BOARD

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Full-spread, spray-applied, low-rise, two-component urethane adhesive.
2. VOC content for Adhesives and Sealants: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."
3. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Glass-Mat Gypsum Cover Board: ASTM C1177/C1177M, water-resistant gypsum board.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Certainteed; SAINT-GOBAIN.
   b. Georgia-Pacific Gypsum LLC.
   c. National Gypsum Company.
   d. USG Corporation.
   e. Or approved equal.

2. Thickness: 1/2 inch.
3. Surface Finish: Unprimed.

2.7 ELECTRONIC LEAK DETECTION (ELD) MATERIALS

A. Conductive Medium: Materials providing less than 104 ohms per square as determined in accordance with ASTM D4496 and approved by roof membrane manufacturer.

1. Electrically Conductive Primer: Water-based, non-flammable, nonmetallic, low-VOC primer.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Carlisle SynTec Systems.
   b. Detec Systems.
   c. ILD International Leak Detection.
   d. Or approved equal.

2.8 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

1. Color: Contrasting with roof membrane.

B. Walkway Roof Pavers: Heavyweight, hydraulically pressed concrete units, with top edges beveled 3/16 inch, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C140/C140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C67; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hanover Architectural Products.
    b. Roofblok Limited.
    c. Sunny Brook Pressed Concrete Company.
    d. Wausau Tile Inc.
    e. Westile Roofing Products.
    f. Or approved equal.

2. Size: 24 by 24 inches. Manufacture pavers to dimensional tolerances of plus or minus 1/16 inch in length, height, and thickness.
3. Compressive Strength: 7500 psi, minimum.
4. Colors and Textures: As selected by Commissioner from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
5. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.

    a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with not less than three tests probes.
    b. Submit test reports within 24 hours after performing tests.

6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
7. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.
8. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.

1. Submit test result within 24 hours after performing tests.

a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

D. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.4 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.

C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 072726 "Fluid-Applied Membrane Air Barriers."

3.5 INSTALLATION OF VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.

2. Seal laps by rolling.

3.6 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Concrete Decks:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows or end joints staggered not less than 12 inches in adjacent rows.

    a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    b. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    c. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation so that water flow is unrestricted.

    d. Fill gaps exceeding 1/4 inch with insulation.
    e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    f. Adhere base layer of insulation to vapor retarder according to FM Global Property Loss Prevention Data Sheet 1-29, as follows:

        1) Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft., and allow primer to dry.
        2) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

2. Install upper layers of insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

    a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    b. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    c. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation so that water flow is unrestricted.

    d. Fill gaps exceeding 1/4 inch with insulation.
    e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    f. Adhere each layer of insulation to substrate using adhesive according to FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.7 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

    a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to substrate using adhesive according to FM Global Property Loss Prevention Data Sheet 1-29, as follows:

    a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
    b. Where required by wind uplift requirement, in addition to adhering, mechanically fasten cover board.

3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. In addition to adhering, when required by wind uplift requirement, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

G. Apply roof membrane with side laps shingled with slope of roof deck where possible.

H. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.

2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.9 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 INSTALLATION OF WALKWAYS

A. Flexible Walkways:

1. Install flexible walkways at the following locations:

a. Locations indicated on Drawings.
b. As required by roof membrane manufacturer's warranty requirements.

B. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions.

1. Install roof paver walkways at the following locations:

a. Locations indicated on Drawings.
b. As required by roof membrane manufacturer's warranty requirements.

2. Provide 3 inches of space between adjacent roof pavers.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Commissioner.

B. Perform the following tests:

1. Infrared Thermography: Testing agency surveys entire roof area using infrared color thermography according to ASTM C1153.

    a. Perform tests before overlying construction is placed.
    b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection tests.
    c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.

        1) Cost of retesting is Contractor's responsibility.

    d. Testing agency to prepare survey report of initial scan indicating locations of entrapped moisture, if any.

2. Electrical Capacitance/Impedance Testing: Testing agency surveys entire roof area for entrapped water within roof assembly according to ASTM D7954/D7954M.

    a. Perform tests before overlying construction is placed.
    b. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.

        1) Cost of retesting is Contractor's responsibility.

    c. Testing agency to prepare survey report indicating locations of entrapped moisture, if any.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Commissioner, and to prepare inspection report.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.12 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Commissioner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Low-slope roof sheet metal fabrications.
2. Wall sheet metal fabrications
3. Miscellaneous sheet metal fabrications.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 077100 "Roof Specialties" for manufactured copings, roof-edge specialties, and roof-edge drainage systems.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Sample Warranty: For finishes.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Fabricator Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/2.

1. Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge, including apron flashing, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

A. Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install copings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Structural Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:

a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Custom Color: Matching metal panel finish specified in Section 074213.16, "Metal Plate Wall Panels," as determined by Commissioner.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

C. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).

a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

D. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle Residential; a division of Carlisle Construction Materials.
b. GCP Applied Technologies Inc.
c. Henry Company.
d. Or approved equal.

2. Source Limitations: Obtain underlayment from single source from single manufacturer.
3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

E. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.3 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

C. Solder:

1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C920, elastomeric polysulfide polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cheney Flashing Company.
b. Fry Reglet Corporation.
c. Keystone Flashing Company, Inc.
d. Or approved equal.

2. Source Limitations: Obtain reglets from single source from single manufacturer.
3. Material: Stainless steel, 0.0188 inch thick.
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
6. Accessories:

a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

7. Finish: Mill.

2.4 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrate without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

3. Joints at architecturally exposed locations must have spline 6 inches wide with 6 inch lap for concealed flashing.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

H. Do not use graphite pencils to mark metal surfaces.

I. End Dams: As specified in paras. 2.6A & B.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Counterflashing: Shop fabricate interior and exterior corners.Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

B. Flashing Receivers: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.
2. Stainless Steel: 0.0156 inch thick.

C. Roof-Penetration Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.

D. Roof-Drain Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

2.6 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high end dams fully formed and welded. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch high, end dams fully formed and welded. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

B. Install slip sheet, wrinkle free, directly on substrate before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lapp joints not less than 4 inches.

3.4 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch into sealant.
b. Form joints to completely conceal sealant.
c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
2. Do not solder aluminum sheet.
3. Do not pretin zinc-tin alloy-coated copper.
4. Do not use torches for soldering.
5. Heat surfaces to receive solder, and flow solder into joint.

a. Fill joint completely.
b. Completely remove flux and spatter from exposed surfaces.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.5 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

3.6 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of interlocking folded seam and sealant or anchor and washer spaced at 12 inches o.c. along perimeter and 6 inches o.c. at corners areas unless otherwise indicated.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.7 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.

3.8 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

3.9 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.10 CLEANING

A. Clean and neutralize flux materials. Clean excess solder and sealant.

3.11 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Commissioner.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract.".

1.2 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge specialties.
3. Roof-edge drainage systems.

B. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim including reglets and counterflashing.
2. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Commissioner, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.

D. Samples for Verification:

1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
2. Include copings, roof-edge specialties and roof-edge drainage systems made from 12-inch lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of roof specialty.

B. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.

C. Sample Warranty: For finishes.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge and fascia, approximately 10 feet long, including supporting construction, seams, attachments, underlayment, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. SPRI Wind Design Standard: Manufacture and install copings and roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Structural Drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COPINGS

A. Metal Copings: Custom fabricated coping system consisting of metal coping cap in section lengths as indicated on Drawings, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Aluminum Coping Caps: Aluminum sheet, 0.125 inch thick plate.

    a. Surface: Smooth, flat finish.
    b. Finish: Three-coat fluoropolymer.
    c. Custom Color: Matching curtain wall specified in Section 084423 "Structural-sealant-glazed Curtain Walls, as determined by Commissioner .

2. Corners: Factory mitered and soldered continuously welded.
3. Coping-Cap Attachment Method: As indicated on Drawings.

2.3 ROOF-EDGE SPECIALTIES

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ATAS International, Inc.
    b. Berridge Manufacturing Company.
    c. Hickman Company, W. P.
    d. Or approved equal.

2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.050 inch thick.

    a. Surface: Smooth, flat finish.
    b. Finish: Three-coat fluoropolymer.
    c. Color: As selected by Commissioner from manufacturer's full range .

3. Corners: Factory mitered and continuously welded.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Receiver: Aluminum sheet, 0.050 inch thick.
6. Special Fabrications: Cornice fascia cover.
7. Fascia Accessories: Fascia extenders with continuous hold-down cleats Wall cap.

B. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding 12 feet, with a horizontal flange and vertical legfascia terminating in a drip edge, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Berridge Manufacturing Company.
b. Cheney Flashing Company.
c. Hickman Company, W. P.
d. Or approved equal.

2. Formed Aluminum Sheet Gravel Stops: Aluminum sheet, 0.050 inch thick.

a. Surface: Smooth, flat finish.
b. Finish: Three-coat fluoropolymer.
c. Color: As selected by Commissioner from manufacturer's full range.

3. Corners: Factory mitered and continuously welded.

2.4 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ATAS International, Inc.
2. Cheney Flashing Company.
3. Drexel Metals; Carlisle Construction Materials.
4. Metal-Era, Inc.
5. Or approved equal.

B. Parapet Scuppers, where indicated: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

1. Stainless Steel: 0.0188 inch thick.

C. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim,.

1. Stainless Steel: 0.0156 inch thick.

D. Stainless Steel Finish: ASTM A480/A480M No. 2B (bright, cold rolled, unpolished).

2.5 REGLETS AND COUNTERFLASHINGS

A. Refer to Section 076200 "Sheet Metal Flashing and Trim."

2.6 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

B. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.

2.7 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Refer to Section 076200 "Sheet Metal Flashing and Trim."

B. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. minimum.

2.8 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
2. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

B. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant (Concealed): ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.9 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

    1. Apply continuously under copings and roof-edge specialties.
    2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

B. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.4 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of stainless steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.5 INSTALLATION OF COPINGS

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.6 INSTALLATION OF ROOF-EDGE SPECIALITIES

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.7 INSTALLATION OF ROOF-EDGE DRAINAGE SYSTEMS

A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. Seal or solder exterior wall scupper flanges into back of conductor head.

C. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch below scupper discharge.

3.8 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

A. Refer to Section 076200 "Sheet Metal Flashing and Trim."

3.9 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Hatch- type heat and smoke vents.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

D. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Stainless-steel: 0.078 inch thick sheet.

1. Finish: No. 2D, directional polish finish.

D. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
3. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange.
5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
6. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
8. Nailer: Factory-installed wood nailer under top flange on side of curb, continuous around curb perimeter.
9. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
10. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 HEAT AND SMOKE VENTS

A. Hatch-Type Heat and Smoke Vents: Manufacturer's standard, with single-walled insulated curbs, welded or mechanically fastened and sealed corner joints, integral condensation gutter, and cap flashing. Fabricate with insulated double-walled lid and continuous weathertight perimeter lid gaskets, and equip with automatic self-lifting mechanisms and UL-listed fusible links rated at 165 deg F including connection to smoke-detection system within elevator shaft.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Bilco Company (The).
    b. Milcor; Commercial Products Group of Hart & Cooley, Inc.
    c. Nystrom.
    d. Or approved equal.

2. Type and Size:

    a. Single-leaf lid, size as indicated on Drawings.

3. Loads: Minimum 40-lbf/sq. ft. external live load and 30-lbf/sq. ft. internal uplift load.

    a. When release is actuated, lid to open against 10-lbf/sq. ft. snow or wind load and lock in position.

4. Heat and Smoke Vent Standard: Provide units that have been tested and listed to comply with UL 793.
5. Curb, Framing, and Lid Material, steel: Zinc-coated (galvanized) steel sheet.

    a. Thickness: Manufacturer's standard thickness for hatch size indicated.
    b. Finish: Baked enamel or powder coat.
    c. Color: As selected by Commissioner from manufacturer's full range.

6. Construction:

    a. Insulation: As standard with hatch manufacturer to meet required R-value.

        1) R-Value: 12.0 according to ASTM C 1363 unless otherwise required.

    b. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
    c. Exterior Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
    d. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
    e. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.

7. Hardware: Manufacturer's standard stainless steel; with hinges, hold-open devices, and independent manual-release devices for operation of lids.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Heat and Smoke Vent Installation:

1. Install heat and smoke vent so top perimeter surfaces are level.
2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.

E. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.4 CORRECTIVE WORK AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.

B. Clean exposed surfaces according to manufacturer's written instructions.

C. Clean off excess sealants.

D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 077273 - VEGETATED ROOF SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Continuous vegetated roof assemblies (Green Roof) to the extent shown on the drawings.

a. Covering profile consisting of the following:

1) Plants.
2) Engineered soil media.
3) Water Retention Layer.
4) Detention Honeycomb.
5) Detention Layer,
6) Detention drain enclosures.

B. Related Requirements:

1. Section 075423 "Thermoplastic Polyolefin (TPO) Roofing" for roofing membrane, roof thermal insulation, and roofing system warranty.
2. Section 221423 "Storm Drainage Piping Specialties" for roof drainage work.

1.3 DEFINITIONS

A. Captured Water: Water that is retained in the drainage layer of a vegetated roof assembly after new water additions have ceased and that cannot escape the roof except through evaporation or plant transpiration.

B. Finish Elevation: Elevation of finished growing-media surface of planting area.

C. Planting Area: Areas to be planted.

D. Plant; Plant Material: Vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

E. Growing Medium: Manufactured, lightweight soil mixture that promotes good growing conditions for specific varieties of plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each vegetated roof assembly.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include material descriptions for each growing medium.

B. Shop Drawings: For each vegetated roof assembly.

1. Include plans, sections, slopes, and drain locations.
2. Indicate dimensions, weights, and loads.
3. Detail field assembly of components, depth of growing media, and attachments to other work.

C. Samples for Verification: For each of the following components of vegetated roof assembly:

1. Growing Media: 1 gallon container volume of each growing medium, in sealed plastic bags labeled with content and source. Each Sample shall be typical of the lots of growing media to be furnished. Provide an accurate representation of texture and composition.
2. Vegetation: 12 inch by 24 inch sample of the actual vegetation
3. Moisture-Retention Layer/Mat: 12 by 12 inches.
4. Drainage Panels: 12 by 12 inches.
5. Root Barrier, where required and used: 12 by 12 inches.
6. Detention Honeycomb (Geofoam Fill): 12 by 12 inches.
7. Detention Layer (Separation Geotextile): 12 by 12 inches.
8. Detention drain enclosures: Manufacturer's standard size..
9. Access Boxes (Drainage Inspection Chambers): One in each size and color required.
10. Edging (Soil Retainer): Manufacturer's standard size to verify configuration and color selected.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of manufactured product.

1. Manufacturer's certified analysis of standard products.

C. Product Test Reports: For complete analysis of each growing medium, for tests performed by manufacturer and witnessed by a qualified testing agency or by a qualified testing agency.

D. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For vegetated roof assembly and plants, including a recommended maintenance plan with procedures for inspection and care during a calendar year. Submit before start of required warranty and maintenance periods.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1 and that employs installers and supervisors who are trained and approved by manufacturer.

1. Nursery shall have a minimum of 3 years of experience growing commercial Sedum crops.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer.

B. Bulk Materials:

1. Do not dump or store bulk materials on or near structures, utilities, walkways and pavements, or existing roof areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of debris-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with product certificates.

C. Handle and store materials, and place equipment in a manner to avoid overloading roof structure or damaging roofing membrane.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain vegetated roof assembly components from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Vegetated roof covering system must retain at least 1.50 gallons of captured water per square foot and weigh not more than 30 lbs per square foot, fully saturated,

1. Coordinate with roofing membrane manufacturer for maximum flow rate in cubic feet per second per acre during a 24-hour Type II storm of 6.2 inch volume when modeled with antecedent moisture content at field capacity.
2. System must support a perennial plant landscape and provide efficient drainage of moisture that is in excess of moisture required for the vigorous growth of the installed vegetation.

B. Comply with ANSI VF-1 and ANSP/SPRI RP-14.

2.3 VEGETATED ROOF ASSEMBLIES

A. Continuous Vegetated Roof Assembly: Continuous-coverage assembly consisting of manufacturer's standard vegetated roof assembly components for installation over roofing membrane system.

1. Assembly Depth, Nominal: 8 incheswith components as follows.

a. Sedum Mat: 1/2 inch.
b. Soil: 4 1/2 inch.
c. Needled Mineral Wool: 2 inch.
d. Honeycomb: 1 inch.
e. Detention Layer: 1/4 inch.

2. Assembly Weight: Maximum 15 lb/sq. ft., including growing medium and plants and saturated with captured water, but not including weight of roofing system.
3. Plantings: Basis-of-Design Product: Subject to compliance with requirements, provide Sunray Sempergreen Sedum-Mix Blanket or comparable product by one of the following:

a. Columbia Green Technologies.
b. GreenTech, Inc..
c. Weston Solutions, Inc..
d. Or approved equal.

2.4 VEGETATED ROOF ASSEMBLY COMPONENTS

A. Moisture-Retention Mat where used: Assembly manufacturer's standard water-retaining fabric manufactured from recycled synthetic fibers.

B. Detention and Drainage Layer (Drainage Panels): Flexible layer comprised of vertically oriented nylon threads between two knit layers of enclosing nylon fabric.

1. System Thickness: (ASTM D-1777): 5 mm.
2. Transmissivity: (ASTM D-4716 at 50psf) per graph below +/- 5 percent.

C. Root Barrier: Vegetated roof assembly manufacturer's standard plastic sheet manufactured from polyethylene or polypropylene plastic; formulated to resist root growth and bacteria.

D. Erosion-Control Fabric: Vegetated roof assembly manufacturer's standard erosion-control fabric.

E. Anti-Slip Devices: Vegetated roof assembly manufacturer's standard anti-slip devices.

F. Honeycomb Detention Reservoir:

1. Rigid sheet formed of fused polypropylene tubes oriented vertically when sheet is laid horizontally, i.e. “honeycomb visual appearance.
2. Tube diameter: 10 mm.
3. Void space: >93 percent.
4. Thickness: 1-inch.

G. Detention Drain Enclosures: Prefabricated units with drain gate and solid corners. Units must include the following:

1. Base sheet (110 by 86 inches) compatible material to TPO roofing membrane.
2. Detention layer surround:5 mm thick
3. Aluminum enclosure: 125 inch thick, mill finish 48 by 24 by 10 inch high, secured with 1/4-20 stainless steel fasteners.

2.5 MANUFACTURED GROWING MEDIA

A. Growing Medium : Vegetated roof assembly manufacturer's lightweight, manufactured soil mixture.

1. Water Retention Layer: Single and multiple layers of mechanically engineered, fire-resistant, needled mineral wool as required for specific water capacity needs. The product shall be completely free from any organic or inorganic binders, as well as any other fiber coatings.

a. Thickness: 1.02 inches (26 millimeters) in single or multiple layers as required to achieve the project water retention and detention requirements.
b. Density: ASTM E2397. Not less than 130 kilograms/cubic meter (8 lbs/cubic foot) and not more than 200 kilograms/cubic meter (12 lbs/cubic foot).
c. Water Retention: ASTM E2397: 93 percent.

2. Growth Media: Semi-intensive and intensive growth media shall consist of a mix of light weight aggregate combined with organic components, containing all the physical, chemical, and biological properties to create a sustainable landscape that mimics nature and encourages microbial soil health with the goal to grow healthier plants, reduce runoff, eliminate irrigation and minimize the need for synthetic fertilizers. Mix shall be pre-blended offsite and delivered ready for installation.

    a. Confirm with growth media provider what the estimated shrinkage factor should be to properly calculate the amount of substrate needed after completion.
    b. Final mix shall be tested in a certified laboratory to ensure the following requirements are met.

3. Vegetation: As indicated by selected manufacturers product designation.

    a. Sedum Blankets: Biodegradable vegetation blanket produced with substrate mix on a coir mat.

4. General Condition at Time of Planting: Free of aggregates 1/2 inch or larger in any dimension; free of roots, plants, clods, pockets of sand, paint, building debris, oils, solvents, roofing materials, and other extraneous materials harmful to plant growth; free of weeds, disease-causing plant pathogens, and other undesirable organisms.

2.6 ACCESSORIES

A. Protection Board: As recommended by roofing-membrane manufacturer.

B. Access Boxes: Manufacturer's standard plastic or aluminum boxes with removable, rigid covers for accessing drains, valves, and switches beneath the finish elevation of growing medium; secure each cover with four noncorrosive screws.

C. Soil Retainer: Vegetated roof assembly manufacturer's polyethylene or vinyl or formed stainless-steel edging with drainage openings.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine each area to receive vegetated roof assembly for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify that roof insulation over roofing membrane is in place, secure, and flush along all seams.
2. Verify that perimeter and other flashings are in place and secure along entire lengths where they will be covered by vegetated roof assembly.

B. Coordinate installation of Detention Drain Enclosures with roofing membrane and roof drain installation.

C. Inspect growing medium.

1. Verify that no foreign or deleterious material or liquid, such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in growing medium within a planting area.
2. If growing medium is contaminated by foreign or deleterious material or liquid, remove growing medium and contamination and replace with new growing medium.

3.3 INSTALLATION, GENERAL

A. Protection Course: Cover roofing system with protection board with butted and fully taped joints before roofing system is subject to vegetated roof assembly installation work.

B. Install vegetated roof assembly according to manufacturer's written instructions.

C. Sloped Roofs: Install erosion-control fabric and anti-slip devices for slopes steeper than 1/2 inch per 12 inches according to manufacturer's written instructions.

D. Access Boxes: Install access box at each drain, valve, and switch and at locations shown on Drawings. Install top of boxes level with or 1 inch above the finish elevation of growing medium.

3.4 PLANTING

A. Perform planting according to vegetated roof assembly manufacturer's written instructions.

B. Do not place growing medium or plants during frozen, wet, or muddy conditions.

C. Suspend spreading, grading, and planting operations during periods of excessive moisture until the moisture content in growing medium reaches acceptable levels to attain the required results.

D. Uniformly moisten an excessively dry growing medium that is too dusty or unworkable.

E. Seeding Grasses: Sow seed at a total rate of 2 lb/1000 sq. ft. unless otherwise required .

F. Meadow Grasses and Wildflowers: Sow seed at a total rate of 4 oz./1000 sq. ft. unless otherwise required .

G. Sprigging Grasses: Plant individual sprigs with roots and portions of stem in moistened growing medium, 6 inches or 12 inches apart in rows 10 inches to 12 inches apart, and fill furrows without covering growing tips. Lightly roll and firm growing medium around sprigs after planting.

H. Plugging: Plant plugs in holes or furrows, spaced 12 inches apart in both directions or triangular pattern.

3.5 SOIL-RETAINER INSTALLATION

A. Install soil retainer where indicated according to manufacturer's written instructions. Secure with adhesive.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage Vegetated Roof System manufacturer's authorized service representative to provide inspection of vegetated roof assembly installation and prepare inspection reports.

3.7 PROTECTION

A. Protect vegetated roof assemblies from damage, including growing-medium contamination, due to operations of other contractors and trades. Repair or replace damaged vegetated roof assemblies.

END OF SECTION 077273

SECTION 078100 - APPLIED FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Sprayed fire-resistive materials.

1.3 DEFINITIONS

A. SFRM: Sprayed fire-resistive materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Sprayed fire-resistive materials.
2. Substrate primers.
3. Bonding agent.
4. Reinforcing fabric.
5. Reinforcing mesh.
6. Sealer.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
3. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
4. Health Product Declaration (HPD): Provide documentation confirming product compliance with one of the following:

    a. Inventory or HPD to at least 0.01 percent by weight, with at least 95 percent assessed using GreenScreen Benchmark assessment.
    b. Cradle to Cradle v3 certification with minimum Silver level of Material Health.
    c. Living Product Challenge certification indicating achievement of Imperative 09, "Transparent Material Health."

C. Shop Drawings: Framing plans or schedules, or both, indicating the following:

1. Extent of fire protection for each construction and fire-resistance rating.
2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to the Commissioner.
3. Minimum sprayed fire-resistive material thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
4. Treatment of sprayed fire-resistive material after application.

D. Samples: For each exposed product and for each color and texture specified, 4 inches square in size.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of sprayed fire-resistive material.

C. Preconstruction Test Reports: For fire protection.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with properly trained staff to install manufacturer's products in accordance with specified requirements.

C. Mockups: Build mockups to set quality standards for materials and execution.

1. Build mockup of each type of fire protection and different substrate as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.

1. Bond Strength: Test for cohesive and adhesive strength in accordance with ASTM E736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
2. Density: Test for density in accordance with ASTM E605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with sprayed fire-resistive material.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain sprayed fire-resistive material manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is 44 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.

B. Source Limitations: Obtain fire protection for each fire-resistance design from single source.

C. Fire-Resistance Design: Indicated on Drawings, tested in accordance with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

D. VOC Content: For field applications, coatings to comply with VOC content requirements per DDC General Conditions and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Primers, Sealers, and Undercoaters: 100 g/L.

E. Low-Emitting Materials: For field applications, coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. Sprayed Fire-Resistive Material : Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Carboline Company; a subsidiary of RPM International.
    b. GCP Applied Technologies Inc.
    c. Isolatek International.
    d. Or approved equal.

2. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing in accordance with ASTM E736.
3. Density: Not less than density specified in the approved fire-resistance design, in accordance with ASTM E605.
4. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.
5. Combustion Characteristics: ASTM E136.
6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 10 or less.
    b. Smoke-Developed Index: 10 or less.

7. Comply with the following as indicated by manufacturers product designations:

    a. Compressive Strength: In accordance with ASTM E761.
    b. Corrosion Resistance: No evidence of corrosion in accordance with ASTM E937.
    c. Deflection: No cracking, spalling, or delamination in accordance with ASTM E759.
    d. Effect of Impact on Bonding: No cracking, spalling, or delamination in accordance with ASTM E760.
    e. Air Erosion: Weight loss in 24 hours in accordance with ASTM E859.

8. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21.
9. Finish: Spray-textured finish.

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another qualified testing and inspecting agency for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:

1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency.
2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency based on a series of bond tests in accordance with ASTM E736.

C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency.

D. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by sprayed fire-resistive material manufacturer.

E. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and in accordance with each fire-resistance design.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.

B. Verify that concrete work on steel deck is complete before beginning Work.

C. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning Work.

D. Conduct tests in accordance with sprayed fire-resistive material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.

B. Clean substrates of substances that could impair bond of fire protection.

C. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.4 APPLICATION

A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.

1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

D. Metal Decks:

1. Do not apply fire protection to underside of metal deck substrates until concrete topping, if any, is completed.

2. Do not apply fire protection to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fire protection.

E. Install auxiliary materials as required, as detailed, and in accordance with fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.

F. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.

G. Extend fire protection in full thickness over entire area of each substrate to be protected.

H. Install body of fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.

I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fire protection that differs in color from that of encapsulant over which it is applied.

J. Where sealers are used, apply products that are tinted to differentiate them from fire protection over which they are applied.

K. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.

L. Cure fire protection in accordance with sprayed fire-resistive material manufacturer's written instructions.

M. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

N. Finishes: Where indicated, apply fire protection to produce the following finishes:

1. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: City of New York to perform required special inspections (controlled inspections) under a separate contract.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fire protection will be considered defective if it does not pass tests and inspections.

1. Remove and replace fire protection that does not pass tests and inspections, and retest.

2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.6 CLEANING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.7 PROTECTION

A. Protect fire protection, in accordance with advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.8 CORRECTIVE WORK

A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.

B. Repair fire protection damaged by other work before concealing it with other construction.

C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

SECTION 078123 - INTUMESCENT FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Mastic and intumescent fire-resistive coatings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Mastic and intumescent fire-resistive coatings.
2. Substrate primers.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Framing plans or schedules, or both, indicating the following:

1. Extent of fire protection for each construction and fire-resistance rating.
2. Applicable fire-resistance design designations of a qualified testing and inspecting agency.

3. Minimum mastic and intumescent fire-resistive coating thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of mastic and intumescent fire-resistive coating.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity certified, licensed, or otherwise qualified by mastic and intumescent fire-resistive coating manufacturer as experienced and with properly trained staff to install manufacturer's products in accordance with specified requirements.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is 50 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.

B. Source Limitations: Obtain fire protection for each fire-resistance design from single source.

C. Fire-Resistance Design: Indicated on Drawings, tested in accordance with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

D. VOC Content: For field applications, coatings shall comply with VOC content limits per DDC General Conditions and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Primers, Sealers, and Undercoaters: 100 g/L.

E. Low-Emitting Materials: For field applications, coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Asbestos: Provide products containing no detectable asbestos.

2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

A. Mastic and Intumescent Fire-Resistive Coating : Manufacturer's standard, factory-mixed formulation, and complying with indicated fire-resistance design.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Albi Manufacturing; a division of StanChem, Inc.
    b. Carboline Company; a subsidiary of RPM International.
    c. International Protective Coatings.
    d. PPG Paints; PPG Industries, Inc.
    e. Sherwin-Williams Company (The).
    f. Or approved equal.

2. Application: Designated for "interior general purpose" use by a qualified testing agency.
3. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design.
4. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: 50 or less.

5. Hardness: Not less than 45, Type D durometer, in accordance with ASTM D2240.
6. Finish: Spray-textured finish.

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that are compatible with mastic and intumescent fire-resistive coating and substrates and are approved by UL or another qualified testing and inspecting agency for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by mastic and intumescent fire-resistive coating manufacturer and complying with required fire-resistance design by UL or another qualified testing and inspecting agency.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and in accordance with each fire-resistance design.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.

B. Conduct tests in accordance with mastic and intumescent fire-resistive coating manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.

B. Clean substrates of substances that could impair bond of fire protection.

C. Prime substrate where included in fire-resistance design and where recommended in writing by mastic and intumescent fire-resistive coating manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

3.4 APPLICATION

A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

B. Comply with mastic and intumescent fire-resistive coating manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.

1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

D. Install auxiliary materials as required, as detailed, and in accordance with fire-resistance design and mastic and intumescent fire-resistive coating manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

E. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

F. Extend fire protection in full thickness over entire area of each substrate to be protected.

G. Install body of fire protection in a single course unless otherwise recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.

I. Cure fire protection in accordance with mastic and intumescent fire-resistive coating manufacturer's written instructions.

J. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

K. Finishes: Where indicated, apply fire protection to produce the following finishes:

1. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: City of New York to perform required special inspections (controlled inspections) under a separate contract.

B. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fire protection will be considered defective if it does not pass tests and inspections.

1. Remove and replace fire protection that does not pass tests and inspections, and retest.
2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.6 CLEANING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.7 PROTECTION

A. Protect fire protection, in accordance with advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.8 CORRECTIVE WORK

A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.

B. Repair fire protection damaged by other work before concealing it with other construction.

C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078123

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Requirements:

1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior wall/floor intersections, and in smoke barriers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Include head of wall systems, base of wall systems, floor, and wall penetrations, and joints. Penetration submittals must include MEP penetrations inclusive of metal and non-metal (PVC) piping, conduits, ductwork, cables, and the like.
2. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines.

    a. Obtain approval of Commissioner prior to submittal.

1.6 INFORMATIONAL SUBMITTALS

A. Listed System Designs: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A qualified installer, properly trained by manufacturer, with sufficient trained staff to install products according to specified requirements.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to Commissioner.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.

1) UL in its online directory "Product iQ."
2) Intertek Group in its "Directory of Building Products."
3) FM Approvals in its "Approval Guide."

2.3 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems are to be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Everkem Diversified Products, Inc.
c. Hilti, Inc.
d. RectorSeal Firestop; a CSW Industrials Company.
e. Specified Technologies, Inc.
f. Tremco, Inc.
g. Or approved equal.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:

a. Those within the cavity of a wall.
b. Drains within a concealed space.
c. 4-inch or smaller metal conduit penetrating directly into metal-enclosed electrical switchgear.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

2.4 FILL MATERIALS

A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

D. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

E. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

F. Thermal Wrap: Flexible protective wrap tested and listed for up to 2-hour fire ratings in accordance with ASTM E814/UL 1479 for membrane penetrations or ASTM E1725/UL 1724 for thermal barrier and circuit integrity protection.

2.5 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.4 INSTALLATION OF PENETRATION FIRESTOPPING SYSTEMS

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: City of New York to perform required special inspections (controlled inspections) under a separate contract.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.7 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior wall/floor intersections.
3. Joints in smoke barriers.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Include edge of slab interface with curtain walls.

2. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or submit equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A qualified installer, properly trained by manufacturer, with sufficient trained staff to install products according specified requirements.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to Commissioner.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with Listed System Designs published by a qualified testing agency.

1) UL in its online directory "Product iQ."
2) Intertek Group in its "Directory of Building Products."

B. Rain/Water Resistance: For perimeter fire-barrier system applications, where inclement weather or greater-than-transient water exposure is expected, use products that dry rapidly and cure in the presence of atmospheric moisture sufficient to pass ASTM D6904 early rain-resistance test (24-hour exposure).

2.3 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
3. Provide firestop products that do not contain ethylene glycol.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. ClarkDietrich.

c. Hilti, Inc.
d. MarinoWARE.
e. ROCKWOOL.
f. Or approved equal.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints at Exterior Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. Nelson; Emerson Electric Co., Automation Solutions.
d. ROCKWOOL.
e. Specified Technologies, Inc.
f. Or approved equal.

2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. MarinoWARE.
d. ROCKWOOL.
e. Specified Technologies, Inc.
f. Or approved equal.

E. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition occurs, such as the intersection of a gypsum wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.

3.4 INSTALLATION

A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 IDENTIFICATION

A. Wall Identification: Permanently label walls containing firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft..

B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: City of New York to perform required special inspections (controlled inspections) under a separate contract.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.7 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

END OF SECTION 078443

SECTION 079100 - PREFORMED JOINT SEALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Exterior preformed, foam joint seals.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Preformed, foam joint seals.
2. Extruded-silicone joint seals.

B. Samples for Initial Selection: Manufacturer's color sheets, showing full range of available colors for each type of exposed preformed joint seal.

C. Samples for Verification: Actual samples of each type and color of exposed preformed joint seal.

1. Full size joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint seals.

D. Sustainable Design Submittals:

1. Product Data: For adhesives and sealants, indicating VOC content.
2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.

1.6 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Product Test Reports: For each preformed joint seal, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to set quality standards for materials and execution.

1. Build mockup full height at location approved by Commissioner.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish preformed joint seals to repair or replace those that fail within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. For preformed joint seals, obtain each color, type, and variety of joint seal from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PREFORMED, FOAM JOINT SEALS

A. Preformed, Foam Joint Seals : Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce them in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Basis-of-Design Product: Subject to compliance with requirements, provide EMSEAL Joint Systems, Ltd.; Seismic Colorseal or comparable product by one of the following:

    a. Construction Specialties, Inc.
    b. Schul International Company, Inc.
    c. Willseal LLC, a Tremco Company.
    d. Or approved equal.

2. Design Criteria:

    a. Nominal Joint Width: As indicated on Drawings.
    b. Minimum Joint Width: 50 percent of joint width indicated on Drawings.
    c. Maximum Joint Width: 100 percent of joint width indicated on Drawings.

3. Joint Seal Color: As selected by Commissioner from full range of industry colors.

2.3 MISCELLANEOUS MATERIALS

A. VOC Content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements." .

1. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Primer: Material recommended by preformed joint seal manufacturer for joint substrates indicated.

C. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to preformed joint seal manufacturer, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces, and formulated to promote best adhesion to joint substrates.

D. Masking Tape: Nonstaining, nonabsorbent material compatible with preformed joint seals and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine joints indicated to receive preformed joint seals, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting preformed joint seal performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing preformed joint seals to comply with preformed joint seal manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of preformed joint seal, including dust, paints (except for permanent protective coatings tested and approved for seal adhesion and compatibility by seal manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimal bond with preformed joint seals. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint seals. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.

B. Joint Priming: Prime joint substrates where recommended by preformed joint seal manufacturer or as indicated by tests or prior experience. Apply primer to comply with joint seal manufacturer's written instructions. Confine primers to areas of joint seal bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of adhesive or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION

A. General: Comply with preformed joint seal manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Installation of Preformed, Foam Joint Seals:

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.

3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

3.5 PROTECTION

A. Protect preformed joint seals from damage resulting from construction operations or other causes so seals are without deterioration or damage at time of Substantial Completion.

B. Cut out, remove, and repair damaged or deteriorated seals so repaired areas are indistinguishable from original work.

END OF SECTION 079100

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Silicone and nonstaining silicone joint sealants.
2. Urethane joint sealants and immersible joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.
5. Latex joint sealants.

B. Related Requirements:

1. Section 088000 "Glazing" for sealant used in glass.
2. Section 092900 "Gypsum Board" for acoustical joint sealants.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each joint-sealant product indicated.
2. Joint sealant backing materials.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

D. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

1. Joint-sealant location and designation.
2. Manufacturer and product name.
3. Type of substrate material.
4. Proposed test.
5. Number of samples required.

E. Preconstruction Laboratory Test Reports: For each joint sealant and substrate material to be tested from sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

F. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

G. Field Quality-Control Reports: For field-adhesion-test reports, for each sealant application tested.

H. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

A. Manufacturers' special warranties.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installers: Authorized representative who is properly trained and approved by manufacturer.

C. Testing Agency: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.9 MOCKUPS

A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C1248 to determine stain potential of sealant when in contact with stone and masonry substrates.
4. Submit not fewer than eight pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test adhesion to Project joint substrate as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Commissioner.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Commissioner seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

a. Test Method: Test joint sealants in accordance with , Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C1521.

1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.11 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.12 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Periods: Manufacturers standard for product used but not less than two (2) years from date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Colors of Exposed Joint Sealants: As selected by Commissioner from manufacturer's full range.

2.3 SILICONE JOINT SEALANTS

A. (JS#1): Silicone: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adfast.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Sika Corporation; Joint Sealants.
d. Or approved equal.

B. (JS#2): Silicone, Nonstaining: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Pecora Corporation.
b. Sika Corporation; Joint Sealants.
c. Tremco Incorporated.
d. Or approved equal.

2. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.

2.4 URETHANE JOINT SEALANTS

A. (JS#3): Urethane: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Sika Corporation; Joint Sealants.
b. Sherwin-Williams Company (The).
c. Tremco Incorporated.
d. Or approved equal.

B. (JS#3a): Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C1247, tested in deionized water unless otherwise indicated

1. Urethane, Immersible: Immersible, multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Uses T, NT, and I.

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. (JS#4): Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adfast.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Pecora Corporation.
d. Tremco Incorporated.
e. Or approved equal.

2.6 BUTYL JOINT SEALANTS

A. (JS#5): Butyl-Rubber-Based Joint Sealants: ASTM C1311.

2.7 LATEX JOINT SEALANTS

A. (JS#6): Acrylic Latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

2.8 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin),Type O (open-cell material),Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS'

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
4. Provide flush joint profile at unless otherwise indicated on Drawings in accordance with Figure 8B in ASTM C1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings in accordance with Figure 8C in ASTM C1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

    a. Extent of Testing: Test completed and cured sealant joints as follows:

        1) Perform 10 tests for the first 1000 ft. of joint length for each kind of sealant and joint substrate.
        2) Perform one test for each 1000 ft. of joint length thereafter or one test per each floor per elevation.

    b. Test Method: Test joint sealants in accordance with Method A, Tail Procedure, in ASTM C1521.

1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

c. Inspect tested joints and report on the following:

1) Whether sealants filled joint cavities and are free of voids.
2) Whether sealant dimensions and configurations comply with specified requirements.
3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

d. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.

e. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

C. Prepare test and inspection reports.

3.6 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.7 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.8 JOINT-SEALANT SCHEDULE

A. Exterior joints (JS-#1):

1. Joint Locations:

a. Control and expansion joints in unit masonry.
b. Joints between different materials listed above.
c. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
d. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Commissioner from manufacturer's full range of colors.

B. Exterior and interior joints (JS-#2):

1. Joint Locations:

a. Joints in brick and stone cladding.
b. Joints between different materials listed above.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Finish: Sanded silicone matching color and texture of grout.
4. Joint-Sealant Color: As selected by Commissioner from manufacturer's full range of colors.

C. Exterior joints in horizontal traffic surfaces (JS-#3):

1. Joint Locations:

a. Isolation and contraction joints in cast-in-place concrete slabs.
b. Joints in stone paving units.
c. Joints between different materials listed above.
d. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, M, P, 50, T, NT.
3. Joint-Sealant Color: As selected by Commissioner from manufacturer's full range of colors.

D. Exterior joints in horizontal traffic surfaces subject to water immersion (JS-#3a):

1. Joint Locations:

a. Joints in pedestrian areas.
b. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, immersible, S, P, 25, T, NT, I.
3. Joint-Sealant Color: As selected by Commissioner from manufacturer's full range of colors.

E. Mildew-resistant interior joints in vertical surfaces and horizontal non-traffic surfaces (JS-#4):

1. Joint Locations:

a. Joints between plumbing fixtures and floor, walls, countertops.
b. Control and expansion joints where indicated.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, Mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Commissioner from manufacturer's full range of colors.

F. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement (JS-#5):

1. Joint Locations:

a. Control joints on exposed interior surfaces of exterior walls.
b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Commissioner from manufacturer's full range of colors.

G. Concealed mastics (JS-#6):

1. Joint Locations:

a. Aluminum thresholds.
b. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Commissioner from manufacturer's full range of colors.

H. (JS-#7): Clear Silicone

1. Joint Locations:

a. Interior glazing at butt joints.
b. Other joints as indicated on Drawings.

2. Refer to Section 088000 "Glazing" for requirements.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.
3. Exterior custom hollow-metal doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" or door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly and thermally rated door assembliesor tests performed by a qualified testing agency indicating compliance with performance requirements.

C. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.

D. Field quality control reports.

1.9 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.10 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated doors to have a DHI Fire and Egress Door Assembly Inspector (FDAI) certificate, or to meet the qualifications set forth in NFPA 80, Section 5.2.3.1.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Curries Company; ASSA ABLOY.
2. Deansteel Manufacturing Company, Inc.
3. L.I.F. Industries, Inc.
4. Metropolitan Door Industries Corp.
5. Steelcraft; an Allegion brand.
6. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

2. Temperature-Rise Limit: Where indicated on Drawings, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C518; unless otherwise required for project application.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch (nominal 18-gage).
d. Edge Construction: Model 1, Full Flush.
e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
f. Core: Manufacturer's standard.
g. Fire-Rated Core: Manufacturer's standard vertical steel stiffener ore for fire-rated doors.

2. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (nominal 16-gage).
b. Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Maximum-Duty Doors and Frames: ANSI/SDI A250.8, Level 4; ANSI/SDI A250.4, Level A. .

1. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.067 inch (nominal 14-gage) with minimum A60 coating.
d. Edge Construction: Model 1, Full Flush.
e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.

g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
h. Core: Polystyrene.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (nominal 14-gage), with minimum A60 coating.
b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.5 EXTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

A. Commercial Laminated Doors and Frames: NAAMM-HMMA 867; ANSI/SDI A250.4, Physical Performance Level A.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule.

1) Doors with thin brick veneer laminated to face or attached with panel clip system.

b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (nominal 16-gage), with minimum G60 or A60 coating.
d. Edge Construction: Continuously welded with no visible seam.
e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
f. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
g. Core: Polystyrene.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (nominal 16-gage), with minimum G60 or A60 coating.
b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.6 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.8 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

H. Glazing: Comply with requirements in Section 088000 "Glazing."

2.9 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted hairline joints.

1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.10 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 or NAAMM-HMMA 840.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

    a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8or NAAMM-HMMA 841 and NAAMM-HMMA guide specification indicated.
2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified door inspector to perform inspections and to furnish reports to Commissioner.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.

3.5 CORRECTIVE WORK

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint in accordance with manufacturer's written instructions.

END OF SECTION 081113

SECTION 081216 - ALUMINUM FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior aluminum frames for doors.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for reinforcement requirements.
2. Section 081416 "Flush Wood Doors.
3. Section 087100 "Door Hardware."

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, fire-resistance rating, and finishes.

B. Shop Drawings: For aluminum frames:

1. Include elevations, sections, and installation details for each wall-opening condition.
2. Include details for each frame type, including dimensioned profiles and metal thicknesses.
3. Include locations of reinforcements and preparations for hardware.
4. Include details of anchorages, joints, field splices, connections, and accessories.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard sizes.

D. Samples for Initial Selection: For each type of exposed finish.

1. Include Samples of seals, gaskets, and accessories involving color selection.

E. Samples for Verification: For each type of the following products:

1. Corner Fabrication and Finish: 12-by-12-inch- long, full-size sections of extrusions with factory-applied color finish.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum frames to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver framing system components cartoned or crated to provide protection during transit and project storage.

B. Inspect components upon delivery for damage. Minor damages may be repaired, provided finish items are equal to new work and acceptable to Commissioner. Remove and replace damaged items as directed.

C. Store components on raised platforms in vertical positions with blocking between units to allow air circulation. Keep stored material covered and protected from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain aluminum frames from single source from single manufacturer.

2.2 INTERIOR ALUMINUM FRAMES

A. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Extruded Aluminum Framing: ASTM B221, alloy and temper 6063-T5 unless otherwise required to suit structural and finish requirements, and not less than 0.0125 inch thick.

1. Frames: Must be internally reinforced as required for door hardware used and meet performance standard specified. Hardware reinforcing shall be as specified in Section 081113 "Hollow Metal Doors and Frames."
2. Door Frames: 2 by 6 by 1/8 inch extruded aluminum with 2 by 5/8 inch door stop.

C. Trim where indicated on drawings: Extruded aluminum, not less than 0.062 inch thick; removable, snap-in glazing stops door stops, without exposed fasteners.

D. Doors:

1. As specified in Section 081416 "Flush Wood Doors.".

E. Frame Finish: Use the following as approved by the Commissioner.

1. Factory-applied, powder-coat finish.

a. Custom Color: As selected by Commissioner.

2.3 ACCESSORIES

A. Connectors and Accessories: Provide connectors, fasteners, and accessories required for rigid, secure, complete, and finished framing system.

B. Fasteners: Aluminum, nonmagnetic, stainless steel or other noncorrosive metal fasteners compatible with frames, stops, panels, reinforcement plates, hardware, anchors, and other items being fastened.

1. Exposed fasteners shall be painted to match framing and countersunk with tamperproof style head.

C. Anchors: Aluminum, countersunk, flush head, tamperproof style head

D. Door Silencers: Manufacturer's standard continuous mohair, wool pile, or vinyl seals in black color.

2.4 FABRICATION

A. Shop Assembly: Preassemble items in shop to greatest extent possible. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.Provide concealed corner reinforcements and alignment clips for accurately fitted hairline joints at butted and mitered connections.

B. Factory prepare aluminum frames to receive templated mortised hardware; include cutouts, reinforcements, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Section 087100 "Door Hardware."

1. Locate hardware cutouts and reinforcements as required by fire-rated label for assembly.

C. Fabricate components to allow secure installation without exposed fasteners unless unavoidable.

2.5 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color Chart: RAL is a color matching system that defines colors for paints, coatings and plastics.
2. Color(s): As selected by Commissioner from full range of colors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify that wall thickness does not exceed standard tolerances allowed by throat size of indicated aluminum frame.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install aluminum frames plumb, rigid, properly aligned, and securely fastened in place; according to manufacturer's written instructions.

3.4 ADJUSTING

A. Inspect installation, correct misalignments, and tighten loose connections.

B. Clean exposed frame surfaces promptly after installation, using cleaning methods recommended in writing by frame manufacturer and according to AAMA 609 & 610.

C. Touch Up: Repair marred frame surfaces to blend inconspicuously with adjacent unrepaired surface so touchup is not visible from a distance of 48 inches as viewed by Commissioner. Remove and replace frames with damaged finish that cannot be satisfactorily repaired.

END OF SECTION 081216

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Five-ply flush wood veneer-faced doors and wood frames for transparent finish.
2. Factory priming and finishing flush wood doors and frames.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 064216 "Flush Wood Paneling."
2. Section 081113 "Hollow Metal Doors and Frames."
3. Section 081216 "Aluminum Frames."
4. Section 064216 "Flush Wood Paneling."
5. Section 087100 "Door Hardware."
6. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door trim for openings.
5. Door frame construction.
6. Factory-machining criteria.

7. Factory-finishing specifications.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Chain-of-Custody Qualification Data: For manufacturer and vendor.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite cutouts, and glazing thickness.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Requirements for veneer matching.
9. Doors to be factory finished and application requirements.

D. Samples for Initial Selection: For factory-finished doorsand factory-finished door frames.

E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies to have a DHI Fire and Egress Door Assembly Inspector (FDAI) certificate, or to meet the qualifications set forth in NFPA 80, Section 5.2.3.1.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons, and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.10 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of veneer.
b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty also includes installation and finishing that may be required due to repair or replacement of defective doors and frames.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors indicated to be blueprint matched with paneling from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Wood Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

2.3 FLUSH WOOD DOORS AND FRAMES, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards" or ANSI/WDMA I.S. 1A.

1. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

B. Adhesives: Do not use adhesives that contain urea formaldehyde.

C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.

2.4 SOLID-CORE FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Doors, Solid-Core Five-Ply Veneer-Faced:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Lambton Doors.
b. Masonite Architectural.
c. Oshkosh Door Company.

d. VT Industries Inc.
e. Or approved equal.

2. Performance Grade: ANSI/WDMA I.S. 1A Extra Heavy Duty.
3. Grade: Premium.
4. Faces: Single-ply wood veneer not less than 1/50 inch thick.Veneer matching veneer specified in Section 064216 "Flush Wood Paneling."

   a. Species: White oak.
   b. Cut: Rift cut.
   c. Match between Veneer Leaves: Book match.
   d. Assembly of Veneer Leaves on Door Faces: Center-balance match.
   e. Room Match:

      1) Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.

5. Exposed Vertical and Top Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A.
6. Core for Non-Fire-Rated Doors:

   a. WDMA I.S. 10 structural composite lumber.

      1) Screw Withdrawal, Door Face: 550 lbf.
      2) Screw Withdrawal, Vertical Door Edge: 550 lbf.

   b. Either glued wood stave or WDMA I.S. 10 structural composite lumber.

7. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.

   a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.

8. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

B. Wood Frames: Matching specie and finish of doors.

2.5 SOLID-CORE FIVE-PLY FLUSH WOOD DOORS FOR OPAQUE FINISH

A. Interior Doors, Solid-Core Five-Ply:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Lambton Doors.
   b. Masonite Architectural.
   c. Oshkosh Door Company.
   d. VT Industries Inc.

e. Or approved equal.

2. Performance Grade: ANSI/WDMA I.S. 1A Extra Heavy Duty.
3. Architectural Woodwork Standards Grade: Premium.
4. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.
5. Exposed Vertical and Top Edges: Any closed-grain hardwood.

   a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.

6. Core for Non-Fire-Rated Doors:

   a. Glued wood stave.
   b. WDMA I.S. 10 structural composite lumber.

      1) Screw Withdrawal, Door Face: 550 lbf.
      2) Screw Withdrawal, Vertical Door Edge: 550 lbf.

   c. Either glued wood stave or WDMA I.S. 10 structural composite lumber.

7. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.

   a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.

2.6 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.

2.7 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.

4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.8 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish: Matching wood panels specified in Section 064216 "Flush Wood Paneling."

1. Architectural Woodwork Standards ANSI/WDMA I.S. 1A Grade: Premium.
2. Architectural Woodwork Standards System-5, Varnish, Conversion.
3. Staining: None required.
4. Sheen: Satin.

D. Opaque Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Architectural Woodwork Standards System-9, UV Curable, Acrylated Epoxy, Polyester, or Urethane.
3. Color: As selected by Commissioner from manufacturer's full range.
4. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Install doors and frames to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.

1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
2. Anchor frames to anchors or blocking built in or directly attached to substrates.

    a. Secure with countersunk, concealed fasteners and blind nailing.
    b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

        1) For factory-finished items, use filler matching finish of items being installed.

D. Job-Fitted Doors:

1. Align and fit doors in frames with uniform clearances and bevels as indicated below.

    a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.

2. Machine doors for hardware.
3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
4. Clearances:

    a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
    b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
    c. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
    d. Comply with NFPA 80 for fire-rated doors.

5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
6. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.4 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Commissioner.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated door and frame assembly in accordance with NFPA 80, Section 5.2.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.

3.5 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames.
2. Fire-rated access doors and frames.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

C. Product Schedule: For access doors and frames. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

A. Recessed Access Doors with Concealed Flanges (AD-1):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Acudor Products, Inc.
    b. Karp Associates, Inc.
    c. Milcor; a division of Hart & Cooley, Inc.
    d. Williams Bros. Corporation of America (The).
    e. Or approved equal.

2. Optional Features: Piano hinges .
3. Locations: Back-of-house wall and ceiling.
4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
5. Latch and Lock: Cam latch, screwdriver operated.

B. Interior Flush GFRG Access Doors with Concealed Flanges (AD-2):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Acudor Products, Inc.
    b. Babcock-Davis.
    c. Karp Associates, Inc.
    d. Milcor; a division of Hart & Cooley, Inc.
    e. Williams Bros. Corporation of America (The).
    f. Or approved equal.

2. Optional Features: Piano hinges.
3. Locations: Wall and ceiling.
4. Door Type Concealed-hinge, radius corner.
5. Door and Frame Material: Unpainted glass-fiber-reinforced gypsum, with frames reinforced for hardware and fastenings.
6. Latch and Lock: Cam latch, screwdriver operated.

C. Interior Access Doors for Tiled Walls (AD-3):

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Acudor Products, Inc.: DW-5058-TD Series.

b. Nystrom: RUTK Series.
c. William Bros. Corporation of America (The): WB DWAL 414 Series.
d. Or approved equal.

2.3 FIRE-RATED ACCESS DOORS AND FRAME

A. Fire-Rated, Flush Access Doors with Concealed Flanges (AD-4):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Acudor Products, Inc.
   b. Babcock-Davis.
   c. Karp Associates, Inc.
   d. Nystrom.
   e. Williams Bros. Corporation of America (The).
   f. Or approved equal.

2. Description: Door face flush with frame with concealed flange for gypsum board nstallation, self-closing door, and concealed hinge.
3. Optional Features: Upward-opening doors for ceilings Gasketing Piano hinges.
4. Locations: Wall and ceiling.
5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage, factory primed.
7. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage, factory finished.
8. Frame Material: Same material, thickness, and finish as door.
9. Latch and Lock: Self-closing, self-latching door hardware, Insert operator.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: Same material as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.

1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.

E. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.

a. Color: As selected by Commissioner from full range of industry colors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 083123 - FLOOR DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Aluminum floor doors at detention tank and where indicated.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details materials, individual components and profiles, and finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Floor Doors: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency according to NFPA 288.

2.2 ALUMINUM FLOOR DOORS

A. Angle Frame Aluminum Floor Door:

1. Product: Subject to compliance with requirements, provide one of the following:

a. ACUDOR Products, Inc.; AW-APS
b. Babcock-Davis; Water tight series.
c. Nystrom; Water tight series.
d. U.S.F. Fabrication; W-APS or W-AHS access hatches.
e. Or approved equal.

2. Frame: Mill finish aluminum, angle profile.
3. Door: Single leaf; 1/4-inch-thick, diamond-pattern mill-finish aluminum plate.
4. Loading Capacity: Minimum 625 lbf/sq. ft. with maximum deflection of L/160.
5. Gasketing: Flood. gas, and odor resistant type.

a. Material: EPDM or manufacturer's standard material meeting project requirements.

6. Hardware:

a. Material and Finish: Type 316 stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and brackets, hinges, pins, and fasteners.
b. Hinges: Heavy-duty butt hinges with stainless steel pins.
c. Operating Mechanism: Adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with vinyl grip that allows for one-handed closure, and flush or recessed lift handle.
d. Latch: Stainless steel slam latch.

2.3 MATERIALS

A. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A666. Remove tool and die marks and stretch lines, or blend into finish.

B. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

D. Aluminum Sheet: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

E. Frame Anchors: Same material as door face.

F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.4 FABRICATION

A. General: Provide floor doors manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure floor doors to types of supports indicated.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

E. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that comes in contact with concrete.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions for installing floor doors.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083123

SECTION 084213 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior aluminum-framed entrance door systems.
2. Interior aluminum-framed storefronts.

B. Related Requirements:

1. Section 064023 "Interior Architectural Woodwork" for door pull, custom wood grip.
2. Section 084423 "Structural-sealant-glazed Curtain Walls for exterior All-glass Entrances.
3. Section 087113 "Power Door Operators" for connections to access control.
4. Section 088000 "Glazing" for interior storefront and door glazing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings: For aluminum-framed entrances. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction.
2. Include isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances, showing the following:

a. Joinery, including concealed welds and fasteners.
b. Anchorage.
c. Expansion provisions.
d. Glazing.

3. Include point-to-point wiring diagrams showing the following:

a. Power requirements for each electrically operated door hardware.
b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Statements:

1. For Installer.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For aluminum-framed entrances.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Installer must be an entity meeting requirements of DDC General Conditions Section 014000 article 1.7.C.1.

PART 2 - PRODUCTS

2.1 STOREFRONT MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide YKK AP America Inc; YCW SSG Field Glazed System with 5 1/16 inches system depth matching details indicated on drawings or comparable product by one of the following:

1. Kawneer North America, an Arconic company.
2. Wausau Window and Wall Systems; Apogee Wausau Group, Inc.
3. Or approved equal.

B. Source Limitations: Obtain all components of aluminum-framed entrance, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 INTERIOR ALUMINUM-FRAMED ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: Manufacturers standard.
2. Door Design: As indicated on the drawings.

B. Framing Members: Manufacturer's standard extruded aluminum, minimum 0.125 inch thick and reinforced as required to support imposed loads.

C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

E. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B209.
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
c. Structural Profiles: ASTM B308/B308M.

2. Steel Reinforcement:

a. Structural Shapes, Plates, and Bars: ASTM A36/A36M.

3. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.4 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. Pivot Hinges: BHMA A156.4, Grade 1.

1. Center-Pivot Hinges: Provide top and bottom offset pivots at each door leaf.

C. Push/Pulls: As indicated on drawings, matching entrance door hardware specified in Section 084423 "Structural-Sealant Glazed Curtain Walls," as determined by Commissioner.

2.5 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

2.6 ACCESSORIES

A. Automatic Door Operators: Section 087113 "Power Door Operators." Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

2.7 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

C. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

D. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

E. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

F. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.8 ALUMINUM FINISHES

A. Finish Type and Color:Match curtain wall as specified in Section 084423 "Structural-Sealant Glazed Curtain Walls."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints watertight unless otherwise indicated.

G. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

I. Install joint filler behind sealant as recommended by sealant manufacturer.

J. Install components plumb and true in alignment with established lines and grades.

3.4 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

3.5 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

A. Install entrance doors to produce smooth operation and tight fit at contact points.

1. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware in accordance with entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

END OF SECTION 084213

SECTION 084423 - STRUCTURAL-SEALANT-GLAZED CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Structural-sealant-glazed curtain-wall assemblies.
2. Exterior, swinging glass entrance systems.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for installation of joint sealants installed with structural-sealant-glazed curtain walls and for sealants to the extent not specified in this Section.
2. Section 084213 "Aluminum-Framed Entrances and Storefronts."
3. Section 088000 "Glazing."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
3. Environmental Product Declaration: For each product.

4. Health Product Declaration: For each product.
5. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings: For structural-sealant-glazed curtain walls and glass entrance systems. Include plans, elevations, sections, large scale details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include isometric details of each type of vertical-to-horizontal intersection of structural-sealant-glazed curtain walls, showing the following:

    a. Joinery, including concealed welds.
    b. Anchorage.
    c. Expansion provisions.
    d. Glazing.
    e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following in approved finish with approved gaskets, and accessories:

1. Joinery, including concealed welds and fasteners.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

F. Engineering Services Submittal: For structural-sealant-glazed curtain walls, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: For structural-sealant-glazed curtain walls, accessories, and components from manufacturer.

B. Product Test Reports: For structural-sealant-glazed curtain walls, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Source quality-control reports.

D. Field quality-control reports.

E. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For structural-sealant-glazed curtain walls to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C1401 recommendations for postinstallation-phase quality-control program.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by manufacturer.

1. Installer must be an entity meeting requirements of DDC General Conditions Section 014000 article 1.7.C.1.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Commissioner, except with Commissioner's approval. If changes are proposed, submit comprehensive explanatory data to Commissioner for review.

D. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of structural-sealant-glazed curtain-wall assemblies.

1.9 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area, as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 WARRANTY

A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York as defined in DDC General Conditions, to design structural-sealant-glazed curtain walls and all-glass entrance systems.

B. General Performance: Comply with performance requirements specified, as determined by testing of structural-sealant-glazed curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Structural-sealant-glazed curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Structural Drawings.

D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans of greater than 13 feet 6 inches.

E. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft..

G. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 20 lbf/sq. ft.
2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

H. Interstory Drift: Accommodate design displacement of adjacent stories indicated.

1. Design Displacement: As indicated on Drawings.
2. Test Performance: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.4 at design displacement and 1.5 times the design displacement.

I. Seismic Performance: Structural-sealant-glazed curtain walls shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement and 1.5 times the design displacement.
2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.7 at design displacement and 1.5 times the design displacement.

J. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

    a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.36 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.

2. Solar Heat Gain Coefficient (SHGC): Refer to Section 088000 "Glazing."
3. Air Leakage:

    a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft. when tested in accordance with ASTM E283.

4. Condensation Resistance Factor (CRF):

    a. Fixed Glazing and Framing Areas: CRF for the system of not less than 71 as determined in accordance with AAMA 1503.

K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

L. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

M. Structural Sealant: ASTM C1184. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate, because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 SOURCE LIMITATIONS

A. Obtain all components of structural-sealant-glazed curtain-wall system, including framing and accessories, from single manufacturer**.**

2.3 STRUCTURAL-SEALANT-GLAZED CURTAIN-WALL ASSEMBLIES

A. Product Description: Structural silicone glazed aluminum curtain wall system.

1. Framing System must be thermally improved. Intermediate vertical mullions must be structural silicone glazed with no exposed exterior aluminum. Horizontal and jamb members must have nominal face dimension of 2 1/2 inches, depth as indicated on the drawings.
2. Framing system must provide a flush glazed appearance on sides with no protruding glass stops.

B. Basis-of-Design Product: Subject to compliance with requirements, provide YKK AP America Inc.; YCW 750 SSG, Shop Glazed 4-Sided Toggle 10-3/8 inch system depth, matching details indicated on drawings or comparable product by one of the following:

1. Kawneer North America, an Arconic company.
2. Wausau Window and Wall Systems; Apogee Wausau Group, Inc.
3. Or approved equal.

C. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Glazing System: Retained with structural sealant on two or four sides.
2. Finish: Superior-performance organic finish.
3. System: Either unitized or stick.
4. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
5. Steel Reinforcement: As required by manufacturer.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 GLASS ENTRANCE DOORS

A. MANUFACTURERS

1. Basis-of-Design Product: Subject to compliance with requirements, provide C.R. Laurence Co., Inc.; Entice Series-Ultra-narrow Stile Thermal Entrance System with Blumcraft hardware components or comparable product by one of the following:

    a. Dawson Metal Co.
    b. PRL Glass Inc.
    c. Or approved equal.

2. Source Limitations: Obtain all components of all-glass entrance systems, including framing and accessories, from single manufacturer.

B. Fitting Material: Aluminum or tainless steel clad aluminum.

C. Rail Fittings:

1. Height:

    a. Top Rail: As indicated.
    b. Bottom Rail: 10 inches (255 mm).
    c. Vertical stiles: 3/4 by 1 7/8 inches.

2. Profile: As indicated.
3. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.

D. Anchors and Fastenings: Concealed.

E. Weather Stripping: Pile type; replaceable without removing all-glass entrance doors from pivots.

F. Materials:

1. Aluminum: ASTM B221 (ASTM B221M), with strength and durability characteristics of not less than Alloy 6063-T5.
2. Stainless Steel Door Cladding, where indicated: ASTM A240/A240M or ASTM A666, Type 304.

    a. Finish: ASTM A480/A480M No. 4 directional satin finish.

3. Stainless Steel Entrance Trim: ASTM A240/A240M or ASTM A666, Type 316.

    a. Finish: ASTM A480/A480M No. 4 directional satin finish.

G. Glass: Type GL-2 as specified in Section 088000 "Glazing."

H. Entrance door hardware units in sizes, quantities, and types specified in Division 08 hardware sections unless otherwise recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of fittings.

1. Concealed Floor Closers and Top Pivots.

I. Threshold: As indicated.

1. Refer to Section 057000 "Decorative Metal" for custom stainless steel thresholds.

2.5 GLAZING

A. Comply with Section 088000 "Glazing."

B. Glazing Gaskets:

1. ASTM C864. Manufacturer's standard sealed-corner pressure-glazing system with resilient elastomeric glazing gaskets, setting blocks, shims, and spacers.

a. Visible gaskets must be silicone in custom gray color as selected by Commissioner.
b. Setting blocks, shims, and spacers: EPDM black unless otherwise indicated.

2. Comply with Section 088000 "Glazing."

C. Glazing Sealants:

1. Comply with Section 088000 "Glazing."
2. VOC: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."s.
3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Structural Glazing Sealants: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes into contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in structural-sealant-glazed curtain-wall assembly indicated.

1. Color: Refer to Section 088000 "Glazing."

E. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes into contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.

1. Color: As selected by Commissioner.

2.6 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Structural Profiles: ASTM B308/B308M.

D. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

F. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

G. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent unless otherwise required.

2.7 ACCESSORIES

A. Preformed Silicone Transition System: A shop or field assembled silicone sheet transition assembly for bridging continuously between windows or curtainwall openings and the adjacent air and vapor barrier system.

1. System Requirements:

a. Design shall absorb thermal movement and wind-loading stresses and remain water-tight.
b. Tested as a component of a wall assembly meeting ASTM E2357, the Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
c. Compliance with NFPA 285, the Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
d. Satisfactory adhesion testing on all adjoining substrates.

2. Product: Subject to compliance with requirements, provide one of the following:

a. DOWSIL; Silicone Transition System.
b. GE Silicones/Momentive Performance Materials Inc.; UST2200 Transition Sheet.
c. Tremco; Proglaze.
d. VaproShield;VaprosSilicone Transition Materials.
e. Or approved equal.

B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from 300 series stainless steel.

C. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

D. Concealed Flashing: Dead-soft, 0.018-inch- thick stainless steel, ASTM A240/A240M of type recommended by manufacturer.

E. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. Components curved to indicated radii.

D. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Prepare surfaces that will contact structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
3. Seal joints watertight unless otherwise indicated.
4. Install structural glazing.

a. Set glazing into framing in accordance with sealant manufacturer and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.
b. Set glazing with proper orientation, so that coatings face exterior or interior as specified.
c. Apply structural silicone sealant to completely fill cavity, in accordance with sealant manufacturers written instructions with the framing and glazing in a fully supported position.
d. Brace or stiffen framing and glazing in such a manner to prevent undue stresses on the glass edge seal and structural joints or movement of the glazing, until sealant is fully cured in accordance with manufacturer's recommendations.
e. After structural sealant has completely cured, insert backer rod between lites of glass as recommended by sealant manufacturer.
f. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.
g. Clean and protect glass as indicated in Section 088000 "Glazing."
h. Retain bracing or stiffening until erected to prevent racking of units during transportation and erection.

E. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.9 ALUMINUM FINISHES

A. Metallic Fluoropolymer: AAMA 2605. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

B. Color and Gloss, Basis of Design Product: Subject to compliance with requirements, provide Akzo Nobel Tri-escent II Ultra CKM2C31050 with Akzo Nobel Primer CKA1C22454 or comparable product from one of the following:

1. Linetec.
2. PPG Pittsburch Paints (PPG Industries).
3. Or approved equal.

2.10 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF STRUCTURAL-SEALANT-GLAZED CURTAIN WALLS

A. Comply with manufacturer's written instructions. Install manufacturer's system in accordance with shop drawings and within required tolerances.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

G. Seal joints watertight unless otherwise indicated.

H. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

I. Install components plumb and true in alignment with established lines and grades.

J. Flashing: Lap joints minimum 6 inches, bed in sealant; seal penetrations; use fully welded end dams at jamb terminations.

3.4 INSTALLATION OF EXTERIOR, MANUAL-SWINGING ENTRANCE SYSTEMS

A. Install entrance systems and associated components in accordance with approved shop drawings and manufacturer's written instructions.

B. Set units level, plumb, and true to line, with uniform joints.

C. Maintain uniform clearances between adjacent components.

D. Lubricate hardware and other moving parts in accordance with manufacturer's written instructions.

E. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

3.5 ERECTION TOLERANCES

A. Install structural-sealant-glazed curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Upon request, provide manufacturer's field service consisting of site visit for inspection of product installation in accordance with manufacturer's instructions.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Test Area: Perform tests on representative areas of structural-sealant-glazed curtain walls.

D. Field Quality-Control Testing: Perform the following test on representative areas of structural-sealant-glazed curtain walls.

1. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in Part 2 "Performance Requirements" Article but not more than 0.50 cfm/sq. ft..

    a. Perform a minimum of three tests in areas, as directed by Commissioner.

2. Water Penetration: ASTM E1105 at a minimum uniform static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in Part 2 "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.

E. Structural-Sealant Adhesion: Test structural sealant in accordance with recommendations in ASTM C1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.

1. Test a minimum of six areas on each building facade.
2. Repair installation areas damaged by testing.

F. Structural-sealant-glazed curtain walls will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports.

3.7 CLEANING

A. Clean installed products in accordance with manufacturer's instructions prior to the Commissioner's acceptance, and remove construction debris from project site. Legally dispose of debris.

B. Protect the installed product's finish surfaces from damage during construction.

END OF SECTION 084423

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:

    a. Swinging doors.

2. Electrified door hardware.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames.
2. Section 081216 "Aluminum Frames" for door silencers provided as part of aluminum frames.
3. Section 081416 "Flush Wood Doors."
4. Section 084213 "Aluminum-Framed Entrances and Storefronts" for entrance door hardware.
5. Section 087113 "Power Door Operators" for low-energy or low-energy power-assist operators.

1.3 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and Security systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

B. Keying Conference: Conduct conference at Project site.

1. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:

a. Flow of traffic and degree of Security required.
b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware.

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and Security systems.

C. Samples for Initial Selection: For each type of exposed finish.

D. Samples for Verification: For each type of exposed product, in each finish specified.

1. Sample Size: Full-size units or minimum 2-by-4-inch Samples for sheet and 4-inch long Samples for other products.

a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

2. Tag Samples with full product description to coordinate Samples with door hardware schedule.

E. Door Hardware Schedule: Prepared by or under the supervision of Installer's DHI certified Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.

2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

    a. Identification number, location, hand, fire rating, size, and material of each door and frame.
    b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
    d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
    e. Fastenings and other installation information.
    f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
    g. Mounting locations for door hardware.
    h. List of related door devices specified in other Sections for each door and frame.

F. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing City of New York's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

G. One complete set of special tools required for servicing and adjustment of hardware, including changing of cylinders.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the following requirements:

1. Supplier of products and an employer of workers who are properly trained by product manufacturers, and of a DHI certified Architectural Hardware Consultant who is available during the course of the Work to consult Contractor and Commissioner about door hardware and keying.

a. Warehousing Facilities: In Project's vicinity.
b. Scheduling Responsibility: Preparation of door hardware and keying schedule.
c. Electrified hardware responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to City of New York.

D. Deliver keys and permanent cores to the Commissioner. Coordinate secure delivery method with Commissioner.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three (3) years from date of Substantial Completion unless otherwise indicated below:

a. Exit Devices: Two (2) years from date of Substantial Completion.
b. Manual Closers: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sole Source Manufacturer; Security Hardware: BEST Access System.

1. No Substitutions Permitted.

B. Hardware Sets (HW Set) listed in Part 3 Door Hardware Schedule are included to establish minimum requirement for this project.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested in accordance with UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water unless otherwise indicated.

C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "ADA Standards for Accessible Design" and ICC A117.1-2009.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
    c. Fire Doors: Minimum opening force allowable.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on doors and frames.

2.4 CONCEALED HINGES

A. Concealed Hinges: Fully concealed within mortises in the door edge and frame and allowing door to swing open 180 degrees.

2.5 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Backset: 2-3/4 inches unless otherwise indicated.

C. BHMA A156.13 stamped steel case with steel or brass parts; Series 1000.

2.6 MANUAL FLUSH BOLTS

A. BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

2.7 EXIT DEVICES AND AUXILIARY ITEMS

A. BHMA A156.3.

2.8 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable as directed by Commissioner.

C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.9 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.

2.10 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type or as specified with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.11 CONCEALED CLOSERS

A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.12 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Commissioner.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

    a. Wood or Machine Screws: For the following:

        1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
        2) Strike plates to frames.
        3) Closers to doors and frames.

    b. Steel Through Bolts: For the following unless door blocking is provided:

        1) Surface hinges to doors.
        2) Closers to doors and frames.
        3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.13 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.4 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings and to comply with the following unless otherwise indicated and required.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying schedule or as directed by Commissioner.
2. Furnish permanent cores to City of New York for installation. Coordinate delivery method with Commissioner.

F. Key Control System:

1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
2. Key Lock Boxes: Install where indicated or approved by Commissioner to provide controlled access for fire and medical emergency personnel.
3. Key Control System Software: Set up multiple-index system based on final keying schedule.

G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room. Verify location with Commissioner.

1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.

H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.5 FIELD QUALITY CONTROL

A. Field Inspections: Perform inspections and prepare inspection reports.

1. After hardware installation is complete, inspect door hardware on site and state in each door opening report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

B. Issue inspection report to Commissioner and include corrective actions for improperly functioning hardware.

3.6 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements.
2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements.
3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

B. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make a final check and adjustment of every hardware unit in such space or area. Readjust door control devices to compensate for operation of heating and ventilating equipment.

3.7 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.8 DEMONSTRATION

A. Instruct facility personnel to adjust and operate door hardware.

3.9 DOOR HARDWARE SCHEDULE

A. Hardware Sets (HW Set) as follows:

1. HW Set: 1.0 - NOT USED

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK (McKinney, Allegion)
1	Storeroom Lock	72 8204 LNA WBS	US32D	SA (Sargent, ASSA ABLOY)
1	IC Core	Small Format Master Key to Facility Standard	US15	BE (Best, dormakaba)
1	Floor Stop	RM850	US26D	RO (Rockwood, ASSA ABLOY)
3	Silencer	608/609	Grey	RO

2. HW Set: 1.1 - Doors C09, C10, C18, C20, C22, C23, C24, 109, 110, 210

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Storeroom Lock	72 8204 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	Closer	422 CTB2/ 422 PCTB2 (Mount Closer on Non-Public Side of Door)	WSP	SA
1	Floor Stop	RM850	US26D	RO
3	Silencer	608/609	Grey	RO

3. HW Set: 1.2 - Door 216

4	Invisible Hinge	TE 626 3D A8	SS	TE (Tectus)
1	Storeroom Lock	72 8204 LNA WBS with Extended Spindle	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	O H Holder	1-X26 (90 Degree Hold Open)	WSP	RF
3	Silencer	608/609	Grey	RO

4. HW Set: 2.0 - Doors C11, C12, C13, C14, C15, C16, 105, 211, 212, 213, 214, 215

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Privacy	50 8225 LNA WBS O/S Indicator: VAC/OCC	US32D	SA
1	OH Concealed Closer	3130	689	LC
1	Floor Stop	RM850	US26D	RO
3	Silencer	608/609	Grey	RO

5. HW Set: 3.0 - Door 106

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Passage	8215 LNA WBS	US32D	SA
1	OH Concealed Closer	3130	689	LC
1	Floor Stop	RM850	US26D	RO
3	Silencer	608/609	Grey	RO

6. HW Set: 4.0 - Door 113

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Classroom Lock	72 8237 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	OH Concealed Closer	3130 (White Powder Coated)	RAL	LC
1	Floor Stop	RM850	US26D	RO
3	Silencer	608/609	Grey	RO

7. HW Set: 5.0 - Door C21

8	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Set- Manual Flush Bolt	458-12 (Bottom Bolt) x 458-24 (Top Bolt) Top Bolt to Suit Door Height	US26D	IV (Ives, Allegion)
1	Dust Proof Strike	DP1	US26D	IV
1	Storeroom Lock	72 8204 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	Closer w/ Bumper	422 PCTB2 (Active Leaf)	WSP	SA
1	OH Stop	1-X36 (Inactive Leaf)	SP RF (Rixson, ASSA ABLOY)	
3	Silencer	608/609	Grey	RO

8. Set: 6.0 - Door C02, C03.1, C03.2

2	Center Hung Pivot	375	626	RF
1	Set- Manual Flush Bolt	358-12 (Bottom Bolt) x 358-24 (Top Bolt) Top Bolt to Suit Door Height	US26D	IV
1	Dust Proof Strike	DP1	US26D	IV
1	Deadbolt	72 8203 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
2	Flush Pull	458	US26D	BU (Burns)
2	OH Holder	1-X26	630	RF
3	Silencer	609/609	Grey	RO

9. HW Set: 7.0 - Door ST3.2

4	Invisible Hinge	TE626 3D A8	SS	TE

1	Exit Latch	8213 LNA WBS	US32D	SA
1	Closer with Stop	4040XP SCUSH (White Powder Coated)	RAL	LC
1	Floor Stop	RM850	US32D	RO
3	Silencer	609/609	Grey	RO

10. HW Set: 8.0 - Door 108.2

1	Pocket Door Track	1230 Series x Custom Track Length x Full Width of Opening and Stack Area	AL	GR (Grant)
1	Pocket Door Lock	CS2002CPDL-3-Q for1 3/8" Door (For Lock to be flush with 1 ¾" Door)	US32D	AC (Accurate Lock and Hardware)
1	Mortise Lock	72 41 x Clover Cam (To Suit Lock)	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE

11. HW Set: 9.0 - Door 111

8	Butt Hinge	TA386 NRP 5" x 4.5"	630	MK
1	Set- Manual Flush Bolt	458-12 (Bottom Bolt) x 458-24 (Top Bolt) Top Bolt to Suit Door Height	US26D	IV
1	Dust Proof Strike	DP1	US26D	IV
1	Storeroom Lock	72 8204 LNA WBS	630	SU (Securitron, ASSA ABLOY)
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
2	Floor Stop	RM850	US32D	RO
6	Silencer	608/609	Grey	RO

12. HW Set: S1.0 - Door C06, C08, C17, 107, 108.1, 112, 207, 209

4	Butt Hinge	TA386 NRP 5" x 4.5"	630	MK
1	Power Transfer	EL-CEPT	630	SU
1	Fail Secure Lock	72 RX 8271 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	OH Concealed Closer	3130 (White Powder Coated)	RAL	LC
1	Floor Stop	RM850	US26D	RO

Door C06 only:

Gaskets,		
Head and Jambs	#475	Zero
Drop Seal	#360	Zero

1	Electrolynx Harness	Preinstalled in Door & Frame
1	Door Contact	By Security- Concealed Prep in Door & Frame

1	Card Reader	By Security		
1	Power Supply	By Security		

a. Operation: Door normally closed and secured. Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. Built in request to exit switch to allow authorized egress. Upon loss of power door to remain locked. Always free egress.

13. HW Set: S2.0 - Door C19

8	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Set- Manual Flush Bolt	458-12 (Bottom Bolt) x 458-24 (Top Bolt) Top Bolt to Suit Door Height	US26D	IV
1	Dust Proof Strike	DP1	US26D	IV
1	Power Transfer	EL-CEPT	630	SU
1	Fail Secure Lock	72 RX 8271 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	OH Holder	1-X26	WSP	RF
6	Silencer	608/609	Grey	RO
1	Electrolynx Harness	Preinstalled in Door & Frame		
2	Door Contact	By Security- Concealed Prep in Door & Frame		
1	Card Reader	By Security		
1	Power Supply	By Security		

a. Operation: Door normally closed and secured. Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. Built in request to exit switch to allow authorized egress. Upon loss of power door to remain locked. Always free egress.

14. HW Set: S3.0 - Door ST2.2

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Power Transfer	EL-CEPT	630	SU
1	Fail Safe Lock	72 RX 8270 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	OH Concealed Closer	3130 (White Powder Coated)	RAL	LC
1	Floor Stop	RM850	US26D	RO
3	Silencer	608/609	Grey	RO
1	Electrolynx Harness	Preinstalled in Door & Frame		
1	Door Contact	By Security- Concealed Prep in Door & Frame		
1	Card Reader	By Security		
1	Power Supply	By Security		

a. Operation: Door normally closed and secured. Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. Alarm by Security triggered by door contact shall sound unless bypass with Card reader or mechanical key of alarm for use by authorized personnel. Upon loss of power supply lock shall unlock allowing free egress and reentry.

15. HW Set: S4.0 - Doors ST2.1, ST2.4, ST3.1, ST4.2, ST4.3

4	Butt Hinge	A386 NRP 5” x 4.5”	630	MK
1	Passage Set	8215 LNA WBS	US32D	SA

1	OH Concealed Closer	3130	689	LC
1	Floor Stop	RM850	US26	RO
3	Silencer	608/609	Grey	RO
1	Door Contact	By Security- Concealed Prep in Door & Frame		
1	Alarm	By Security		
1	Card Reader	By Security		
1	Power Supply	By Security		

a. Operation: Alarm by Security triggered by door contact shall sound unless bypass with card.

16. HW Set: S5.0 - Door ST2.3

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Power Transfer	EL-CEPT	630	SU
1	Fail Secure Lock	72 RX 8271 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	Concealed Closer	3130 (White Powder Coated)	RAL	LC
1	Concealed OH Stop	1-x 36	WSP	RF
1	Threshold	3665	MA	LE (Legacy Manufacturing)
1	Weatherseal	5881S	BK	LE
1	Electrolynx Harness	Preinstalled in Door & Frame		
1	Door Contact	By Security- Concealed Prep in Door & Frame		
1	Card Reader	By Security		
1	Power Supply	By Security		

a. Operation: Door normally closed and secured. Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. Built in request to exit switch to allow authorized egress. Upon loss of power door to remain locked. Always free egress.

17. HW Set: S6.0 - Door ST4.1

4	Invisible Hinge	TE626 3D A8	SS	TE
1	Exit Latch	8213 LNA WBS	US32D	SA
1	Closer	422 PCTB2	WSP	SA
1	Concealed OH Stop	1-x 26 (90 Degree Hold Open)	WSP	RF
1	Threshold	3665	MA	LE
1	Weatherseal	5881S	BK	LE
1	Door Contact	By Security- Concealed Prep in Door & Frame		

a. Operation: Door Contact by Security to monitor door. Free egress by lever. No outside trim.

18. HW Set: S7.0 - Door ST2.5

4	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
1	Power Transfer	EL-CEPT	630	SU
1	Fail Safe Lock	72 RX 8273 LNA WBS	US32D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	Closer	MC 422 PCTB2	WSP	SA
1	OH Concealed Stop	1-X36	WSP	SA
1	Threshold	3665	MA	LE

1	Weatherseal	5881S	BK	LE
1	Electrolynx Harness	Preinstalled in Door & Frame		
1	Door Contact	By Security- Concealed Prep in Door & Frame		
1	Alarm	By Security		
1	Card Reader	By Security		
1	Power Supply	By Security		

a. Operation: Door normally closed and secured. Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. Upon loss of power door to unlock from both side of door.

19. HW Set: S8.0 - Door C01

8	Butt Hinge	TA386 NRP 5” x 4.5”	630	MK
2	Power Transfer	EL-CEPT	630	SU
1	Multipoint Lock	72 55 NB WD700615 ERA (Inactive Leaf)	US26D	SA
1	Elec Multipoint Lock	NB 55 WD707415 ERA (Active Leaf)	US26D	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
2	OH Concealed Closer	3130 H	689	LC
2	Floor Stop	RM850	US26D	RO
	Gaskets,			
	Head and Jamb	#475		Zero
	Drop Seal	#360		Zero
2	Electrolynx Harness	Preinstalled in Door & Frame		
2	Door Contact	By Security- Concealed Prep in Door & Frame		
1	Card Reader	By Security		
1	Power Supply	By Security		

a. Operation: Door normally closed and secured. Upon use of mechanical key or presentation of authorized credentials door to unlock allowing authorized entry. Built in request to exit switch to allow authorized egress. Upon loss of power door to remain locked. Always free egress.

20. HW Set: S9.0 - Door 206

1	Floor Closer	BTS80H- Center Hung x Terrazzo Pan	626	DK (dormakaba)
1	Deadbolt Pull	DB170LS3 K LS (Inswing Door)		
1	Cylinder	Push Side & Thumbturn in Pull Side of Door	630	CR
1	Cylinder	To Suit x 72 Keyed Temporary IC Core	630	SA
1	IC Core	Small Format Master Key to Facility Standard	US15	BE
1	Floor Stop	RM850	US26D	RO
	Gasket, Head and Jambs	By Door Manufacturer		
	Door Bottom (Sweep)	By Door Manufacturer		
1	Electric Strike	ESK2 x ESP2	630	CR
1	Door Contact	By Security- Concealed Prep in Door & Frame		

1	Card Reader	By Security		
1	Power Supply	BPS By Security		

a. Operation: Door normally closed and secured. Upon presentation of authorized credential, electric strike is released allowing entry. Request to exit sensor in electric strike signal authorized exit. When power is disconnected, door is locked from outside but allows free egress at all times. Mechanical key override for use by authorized personnel.

21. HW Set: AL S1.0 - Door 101.1

2	Panic With Pull	PA100 Designer Series w/ LS Pull x Keyed	630	CR
2	Cylinder	To Suit Panic x 72 Keyed Temporary IC Core	630	SA
2	IC Core	Small Format Master Key to Facility Standard	US15	BE
2	Electric Strike	ESK2 x ESP2	US32D	CR
1	Automatic Operator	ED250 Fine Cover O H Surface Actuator on Both Sides of Door x 2 Way Actuator at Vestibule x Center Hung Top Pivot (LHR Leaf)	689	DK
1	OH Concealed Closer	RTS01 W/ Center Hung Top Pivot x Bottom Pivotto Suit Threshold (RHR Leaf)	689	DK
1	OH Stop With HO	902H 902RTSCH (RHR Leaf)	630	DK
1	Threshold	Custom – To suit Sill Condition		
1	Seal	By Door Manufacturer		
2	Request to Exit Sensor	By Security		
1	Wiring Diagram	By Security		
1	Card Reader	By Security		
2	Door Contact Frame	By Security -Prep for Concealed Door Position Switch in Door &		
1	Power Supply	BPS By Security		

a. Operation: Exterior door actuator to be activated when electric strike is deactivated or activated momentarily when upon presenting credential. ADA actuators in Vestibule 101 and Lobby 102 always activated. ADA actuator on exterior to be activated/deactivated by Key Switch/Time Clock/Security. During hours of operation, electric strike & door contact is deactivated and auto operator actuator activated by Security to allow free entry and egress and door to open automatically with actuator on either side of door. Automatic operator of interior vestibule door to open sequentially. If timed out ADA actuator in vestibule to allow vestibule door to open automatically. After hours: Key Switch/Timer/Security to engage electric strike and deactivate exterior automatic operator actuator. Entry by mechanic key by authorized personnel only. Free egress by push bar of panic or Vestibule/Lobby actuator to release electric strike and start automatic door operator.

22. HW Set: AL S2.0 - Door 101.2

2	Panic With Pull	PA100 Designer Series w/ LS Pull x Keyed	630	CR
2	Panic With Pull	PA100 Designer Series w/ LS Pull	630	CR
2	Cylinder	To Suit Panic x 72 Keyed		

		Temporary IC Core	630	SA
2	IC Core	Small Format Master Key to Facility Standard	US15	BE
2	Electric Strike	ESK2 x ESP2	US32D	CR
2	OH Concealed Closer	RTS01 W/Center Hung Top Pivot x Bottom Pivot to Suit Threshold (RHR Leaf)	689	DK
2	OH Stop with HO	902H 902RTSCH (RHR Leaf)	630	DK
1	Threshold	Custom – To suit Sill Condition		
1	Seal	By Door Manufacturer		
2	Request to Exit Sensor	By Security		
1	Wiring Diagram	By Security		
2	Door Contact	By Security		
	Prep for Concealed	Door Position Switch in Door & Frame		
1	Power Supply	BPS By Security		

a. Operation: During hours of operation, electric strike is disengaged, door contact de-activated to allow free entry and egress. After hours, electric strike and door contact is activated allowing entry by credential. Mechanical key only for use by authorized personnel in event of emergency. Free egress at all times. In event of emergency, Security can remotely create Security lock down by remotely engaging electric strike

23. HW Set: AL EL1.0 - Door 102.1

1	Automatic Operator	ED250-IG x Center Hung Top Pivot x Terrazzo Pan- Actuator on both sides of door x 2 Way Actuator Terrazzo Pan	689	DK
1	Floor Closer	w/ BTS80 H x Terrazzo Pan (LHR Leaf)	689	DK
4	Pull	Handle LS- Designer Series	630	CR
1	Seal	By Door Manufacturer		
1	Power Supply	By Security		

a. Operation: Contractor to coordinate with related sections to ensure floor is prepared to receive in-ground power operator. Contractor to coordinate with related trades to ensure terrazzo pan depth suits floor finish. floor finish to and ADA actuator on either side of door to open door with ADA operator automatically. If timed out in vestibule, actuator at vestibule shall allow exterior door to open automatically.

24. HW Set: AL 1.0 - Door 102.2

2	Floor Closer w/ HO	BTS80 H x Terrazzo Pan x Center Hung Top Pivot	689	DK
4	Pull	Handle LS- Designer Series	630	CR
1	Seal	By Door Manufacturer		

END OF SECTION 087100

SECTION 087113 - POWER DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Power door operators for swinging doors.

B. Related Requirements:

1. Section 057000 Decorative Metal for bollards to support activation device, switch.
2. Section 084213 Aluminum-framed Entrances and Storefronts.

1.3 DEFINITIONS

A. AAADM: American Association of Automatic Door Manufacturers.

B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.

1.4 COORDINATION

A. Templates: Distribute for doors, frames, and other work specified to be factory prepared and reinforced for installing power door operators.

B. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.

C. Coordinate access control mounting to bollard with Section Section 057000 "Decorative Metal."

D. Electrical System Roughing-in: Coordinate layout and installation of power door operators with connections to the following:

1. Power supplies.
2. Access-control system.
3. Remote activation devices.
4. Remote monitoring systems.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for power door operators.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For power door operators.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Indicate locations of activation and safety devices.
4. Include diagrams for power, signal, and control wiring.
5. Include plans, elevations, sections, and attachment details for guide rails.

C. Samples: For each exposed product and for each color and texture specified, manufacturer's standard size.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of power door operator.

C. Sample Warranties: For manufacturer's special warranties.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An installer who is properly trained by manufacturer for installation of units required for this Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, overhead surface power operator by one of the following:

1. Besam Entrance Solutions; ASSA ABLOY.
2. DORMA USA, Inc.
3. LCN; an Allegion brand.
4. NABCO Entrances, Inc.
5. Or approved equal.

B. Manufacturers: Subject to compliance with requirements, inground power operator by one of the following:

1. Besam Entrance Solutions; ASSA ABLOY.
2. DORMA USA, Inc.
3. Automated Door Solutions
4. Or approved equal.

C. Source Limitations: Obtain power door operators, including activation and safety devices, from single source from single manufacturer.

2.2 POWER DOOR OPERATORS, GENERAL

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and in accordance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.

1. Wind Load: Provide door operators on exterior doors that will open and close doors and maintain them in fully closed position when subjected to wind load indicated.

B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation, including spring closing when power is off.

C. Hardware: Refer to each Section 087100 "Door Hardware"for HW Set AL S1.0 and AL EL1.0.

1. Coordinate with door hardware and operation required for each application.
2. Inground power operator shall be provided with offset pivot under this section,

D. Brackets and Reinforcements: Fabricated from aluminum with non-staining, nonferrous shims for aligning system components.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 POWER DOOR OPERATORS FOR SWINGING DOORS

A. Standard: BHMA A156.10.

B. Performance Requirements:

1. Opening Force:

a. Power-Operated Swinging Doors: Not more than 30 lbf required to manually open door if power fails.

2. Entrapment-Prevention Force: Not more than 40 lbf required to prevent stopped door in the last 10 degrees of opening from moving in the direction of opening; not more than 30 lbf required to prevent stopped door from moving in direction of closing.

C. Configuration: Operator to control one leaf of each pair of swinging doors.

1. Traffic Pattern: Two way.

D. Operation: Power opening and power-assisted spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.10.

E. Operating System: Electromechanical.

F. Microprocessor Control Unit: Solid-state controller.

G. Features:

1. Adjustable opening and closing speed.
2. Adjustable opening and closing force.
3. Adjustable backcheck.
4. Adjustable hold-open time from zero to 30 seconds.
5. Adjustable time delay.
6. Adjustable limit switch.
7. Obstruction re-cycle.
8. Power door re-open if stopped while closing.
9. On-off/hold-open switch to control electric power to operator, key operated.

H. Controls: Activation and safety devices in accordance with BHMA standards.

1. Activation Device, Switch mounted on bollard: Push-plate switch to activate door operator.
2. Safety Device: Presence Sensor: Mounted on door header to detect pedestrians in presence zone and to prevent door from closing.

I. Exposed Finish:

1. Metal Cladding: To match adjacent curtain wall framing.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B221.
2. Sheet: ASTM B209.

B. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness, in manufacturer's standard thickness.

C. Fasteners and Accessories: Corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 CONTROLS

A. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.

1. Configuration:

a. Rectangular push plate with 2-by-4-inch junction box unless otherwise indicated.

1) Mounting: As indicated on Drawings Surface mounted on bollard post.

2. Push-Plate Material: Stainless steel as selected by Commissioner from manufacturer's full range.
3. Message: State of New York Dynamic Symbol of Accessibility and "Push to Open."

2.6 ACCESSORIES

A. Signage: As required by cited BHMA standard for type of door and its operation.

1. Application Process: Operator manufacturer's standard process.
2. Provide sign materials with instructions for field application when operators are installed.

B. In-ground power operator shall be provided with terrazzo pan for field installed floor finish.

2.7 FABRICATION

A. Factory fabricated power door operators to comply with indicated standards.

B. Form aluminum shapes before finishing.

C. Fabricate exterior components to drain condensation and water-passing joints within operator enclosure to the exterior.

D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.

E. Provide metal cladding, completely covering visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

2.8 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary, protective covering before shipping.

B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of power door operators.

B. Examine roughing-in for electrical systems to verify actual locations of power connections before power door operator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install power door operators in accordance with manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.

1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.

B. Controls: Install activation and safety devices in accordance with manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Access-Control System: Connect operators to access-control system as specified in Section 281500 "Access Control System Hardware Devices."

D. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test and inspect each power door operator installation, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.

B. Power door operators will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust power door operators to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

1. Adjust operators on exterior doors for tight closure.

B. After completing installation of power door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.

C. Readjust power door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate power door operators.

END OF SECTION 087113

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Specialty glass.
5. Glazing blocks, shoe gaskets, and accessories for glass railings.
6. Glazing sealants.
7. Glazing tapes.
8. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 057300 "Decorative Metal Railings" for structural requirements in glass railings.
2. Section 084213 "Interior Aluminum-framed Entrances and Storefronts."
3. Section 084423 "Structural-Sealant-Glazed Curtain Walls" for glazing sealants used in structural-sealant-glazed curtain walls.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Glass railing: Glazing blocks, shoe gaskets, and accessories

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Shop drawings for ceramic frit and acid etch patterns.

D. Samples for Verification:

1. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
2. Glazing blocks, shoe gaskets, and accessories
3. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of adjoining framing system.

E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1. Identify position on glass of any safety labels.

F. Engineering Services Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified New York State licensed professional engineer responsible for their preparation.

1.8 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Product Test Reports: For fabricated glass and glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

C. Preconstruction adhesion and compatibility test report.

D. Sample Warranties: For special warranties.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

D. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 084423 "Structural-Sealant-Glazed Curtain Walls" to match glazing systems required for Project, including glazing methods.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.12 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent within specified warranty period. Coverage for any other cause is excluded.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain coated glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated, and determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Wind Design Data: As indicated on Structural Drawings.

2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
3. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC.

1. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
2. Labels shall be positioned in the same location at each unit on a single elevation as approved by the Commissioner.

C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.

D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products as indicated in Part 3 Glass Schedule or comparable by one of the following:

1. AGC/ Interpane
2. Cardinal Glass Industries.
3. Guardian Glass
4. Pilkington North America.
5. Vitro.

B. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

C. Low-Iron, Annealed Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent and SHGC of not less than 0.87.

D. Low-E-Coated Vision Glass: ASTM C1376.

E. Low-Iron, Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) as indicated, Quality-Q3 with visible light transmission of 91 percent.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. Heat soaking: Manufacturer's standard process to eliminate nickel sulfide (NiS) inclusions.
3. Products: Subject to compliance with requirements, provide one of the following:

   a. AGC/ Interpane; Ipawhite.
   b. Guardian; Ultrawhite.

c. Pilkington; Optimwhite.
d. Vitro; Starphire.
e. Or approved equal.

F. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

G. Ceramic-Coated (Frit) Vision Glass: ASTM C1048, Condition C, Type I, Class 1 (clear) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in NGA's "Engineering Standards Manual."

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate two glass panes of unequal thickness with polyvinyl butyral interlayer complying with ASTM C 1172 and manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with project requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Stainless steel.
3. Color: Black or gray as selected by Commissioner.

2.7 SPECIALTY GLASS

A. Description: Museum quality glass with conservation-grade UV coating.

1. Optical coating: Over 97 percent light transmission and less than 1 percent light reflection; engineered for stability and permanence.
2. Enhanced surface for durability and cleaning
3. Surface: Smooth and free of distortion or ripples.

B. Performance Characteristics:

1. Weight: 1.28 lbs. per sq. ft.
2. Coating Process: Magnetron Sputtering.
3. Abrasion Resistance: MIL-C-14806A para 4.4.7, MIL-M13508C para 4.4.5.
4. Corrosion Resistance (Salt Fog): ASTM B17 & B-368-03 & B-368-97.

5. Solubility: MIL-C-48497A.
6. Photographic Activity Test: ISO 18916 & ISO 18902.
7. Inorganic Silica-Based UV Protection: Meets ISO 18902 and passes ISO 18916 by providing at least 97 percent UV protection.
8. RoHS (Restriction of Hazardous Substances) Compliant: Directive 2002/95/EC.
9. AS/NZS 4667:2000: Compliant for dimensional andcosmetic requirements.
10. Accelerated Aging: anti-reflective, UV protection, and light transmission remain unchanged after 2000 hours (estimated to be approximately 100 years) of Q-sun Xenon arc testing at exposure intensity of 100,000 Lux.
11. Oddy Test: Pass- Suitable for permanent use.

2.8 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Colors of Exposed Glazing Sealants: As selected by Commissioner from manufacturer's full range of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 50: Complying with ASTM C920, Type S, Grade NS, Use NT.

1. Basis-of-Design Product: Subject to compliance with requirements, provide The Dow Chemical Company; 995 Structural Silicone Sealant or comparable product by one of the following:

    a. GE Construction Sealants; Momentive Performance Materials Inc.
    b. Sika Corporation.
    c. Tremco Incorporated.
    d. Or approved equal.

2. Applications: Glazed aluminum curtain walls.
3. Color(s): Black or Gray as selected by Commissioner except clear for interior glazing butt joints.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. EPDM with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. EPDM with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.

4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.4 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.5 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.6 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.7 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.8 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces and remove factory applied labels not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.9 GLASS SCHEDULE

A. Type GL-1: Exterior Insulatng/Curtainwall.

1. Configuration: 35 mm (1 3/8 inch) overall thickness:

a. 6 mm (1/2 inch) + 0.76 inch clear PVB interlayer + 6 mm (1/2 inch) thick low iron laminated outer lite with custom warm gray ceramic bird frit pattern on surface 2 and low-E coating on surface 4.

b. Airspace: 12 mm (1/2 inch) stainless steel spacer, argon fill, black PIB, and black or gray structural silicone edge seal as selected by Commissioner.
c. 10 mm (3/8 inch) thick low iron inner lite with low-E coating on surface 6.

2. Insulating glass unit performance excluding ceramic frit shall be equal to or better than the following:

a. Visible Light Transmittance: 67 percent
b. U-Value (Winter): 0.20 BTU/hr ft^2 °F
c. Solar Heat Gain Coefficient: 0.363

3. Basis of Design Product: Subject to compliance with requirements, provide high performance reflective solar control low-E coating: Guardian SunGuard SN68 with IS20 (interior) or one of the following.

a. AGC/Interpane Ipasol Neutral 73/42.
b. Vitro Solarban 60 with Pilkington's Energy Advantage Coating (interior).
c. Or approved equal.

B. Glass Type GL-2: Exterior Insulating/Entrance Doors.

1. Configuration: 24 mm (1 inch) overall thickness.

a. 6 mm fully tempered (FT) low iron outer lite with low-E coating on surface 2.
b. 2 mm (1/2 inch) stainless steel spacer, argon fill, black PIB, and black structural silicone edge seal – 6 mm
c. (1/4 inch) low Iron inner lite with low-E coating on surface 4.

2. Insulating glass unit performance shall be equal to or better than the following:

a. Visible Light Transmittance: 69 percent
b. U-Value (Winter): 0.20 BTU/hr ft^2 °F
c. Solar Heat Gain Coefficient: 0.38

3. Basis of Design Product: Subject to compliance with requirements, provide high performance reflective solar control low-E coating: Guardian SunGuard SN68 with IS20 (interior) or one of the following.

a. AGC/Interpane Ipasol Neutral 73/42.
b. Vitro Solarban 60 with Pilkington's Energy Advantage Coating (interior).
c. Or approved equal.

C. Glass Type GL-3: Glazed Entrances.

1. Configuration: 12 mm (1/2 inch) FT low iron Monolithic.

D. Glass Type GL-4: Interior Wood- and Aluminum-Framed Glazed Partitions.

1. Configuration: 18 mm (3/4 inch) laminated: 6mm low iron heat-strengthened (HS) - 0.060 inch clear PVB interlayer – 12 mm low iron HS.

E. Glass Type GL-4A: Interior Wood- and Aluminum-Framed Glazed Partition/Acid Etch Pattern.

1. Configuration: 18 mm (3/4 inch) Laminated: 6 mm Low Iron HS - 0.060 Clear PVB – 12 mm Low Iron HS with custom acid etch pattern on Surface 1.

F. Glass Type GL-5: Interior Aluminum Framed Glazed Partition/ Opaque Acid Etch.

1. Configuration: 18 mm (3/4 inch) thick, laminated: 6 mm low iron HS with full acid etch on surface 1 - 0.060 clear PVB interlayer– 12 mm low iron HS with full acid etch opaque finish on surface 4.

G. Glass Type GL-6: Exterior Hollow Metal Doors.

1. Configuration: 6 mm (1/4 inch) thick, FT clear monolithic.

H. Glass Type GL-7: Vitrines.

1. Configuration: 2.5 mm thick, clear monolithic.
2. Basis of Design Product: Subject to compliance with requirements, provide Tru Vue, Inc. Museum Glass or comparable product by one of the following.

    a. AGC.
    b. Vitro.
    c. Pilkington.
    d. Or approved equal.

I. Glass Type GL-8: Glass Guardrails.

1. Configuration: Low iron, tempered and laminated, 9/16 inch thick minimum. Tempering symbols where approved by Commissioner. Edges must be polished.

END OF SECTION 088000

SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Gypsum board shaft wall assemblies.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and support them on risers on a flat platform to prevent sagging.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Comply with gypsum-shaftliner-board manufacturer's written instructions.

B. Do not install finish panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E90 and classified according to ASTM E413 by a testing and inspecting agency.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

A. Fire-Resistance Rating: As indicated on Drawings.

B. STC Rating: As indicated on Drawings.

C. Gypsum Shaftliner Board:

1. Moisture- and Mold-Resistant Type X: ASTM C1396/C1396M; manufacturer's standard fire-resistive liner panels with ASTM D3273 mold-resistance score of 10 as rated according to ASTM D3274, 1 inch thick, and with double beveled long edges.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Gypsum.
b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. National Gypsum Company.
e. USG Corporation.
f. Or approved equal.

D. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:

1. Minimum Base-Metal Thickness: 0.030 inch.

E. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.

1. Minimum Base-Metal Thickness: 0.030 inch.

F. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. As specified in Section 092900 "Gypsum Board."

G. Elevator-Hoistway-Entrance Struts: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches, matching studs in depth, and not less than thick.

H. Finish Panels: Gypsum board as specified in Section 092900 "Gypsum Board.".

2.3 Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board." AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with shaft wall manufacturer's written instructions.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.

E. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch minimum thickness of base metal (uncoated).

F. Acoustical Sealant: See Section 092900 "Gypsum Board."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Commissioner while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

END OF SECTION 092116.23

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior on-load-bearing wall studs.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received prior to installation.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

C. Framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.

1. Loading: 5 lbf/sq. ft. minimum unless otherwise indicated on drawings.

D. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. except 1/360 for walls with wood paneling, brick, and other hard surfaces.

E. Framing systems to accommodate deflection of primary building structure and construction tolerances and to withstand design loads with a maximum deflection as follows :

1. Upward movement of 1/2 inch and downward 1 inch unless otherwise indicated and required for project application.

2.2 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Framing Members, General: Comply with AISI S220 and ASTM C645, Section 10 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 and ASTM C645, Section 10 requirements for metal unless otherwise indicated
2. Protective Coating: Comply with ; ASTM A653/A653M, G40; or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.

a. Coating demonstrates equivalent corrosion resistance with an evaluation report acceptable to Commissioner.

C. Studs and Track: AISI S220 and ASTM C645, Section 10.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ClarkDietrich.
    b. Jaimes Industries.
    c. MarinoWARE.
    d. SCAFCO Steel Stud Company.
    e. Telling Industries.
    f. Or approved equal.

2. Minimum Base-Steel Thickness: 30 mils (0.0296 inch (20 gage)).
3. Depth: As indicated on Drawings.

D. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.
2. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) CEMCO; California Expanded Metal Products Co.
        2) ClarkDietrich.
        3) MarinoWARE.
        4) Metal-Lite.
        5) Telling Industries.
        6) Or approved equal.

E. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ClarkDietrich.
    b. Fire Trak Corp.
    c. MarinoWARE.
    d. Metal-Lite.
    e. Or approved equal.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: As indicated on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Minimum Base-Steel Thickness: 0.0179 inch.
2. Depth: As indicated on Drawings.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report based on ICC-ES AC01 AC193 AC58 or AC308 as appropriate for the substrate.

a. Uses: Securing hangers to structure.
b. Type: Torque-controlled, expansion anchor torque-controlled, adhesive anchor.
c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

B. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

C. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.

D. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.

2. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical or hat shaped.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

C. Blocking: Sheet metal for use with plywood.

1. Basis of Design Product: Subject to compliance with requirements, provide ClarkDietrich; FastBack FBBC anchor or comparable product by one of the following:

a. MarinoWARE.
b. SCAFCO Steel Stud Company.
c. Telling Industries.
d. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.4 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.5 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.6 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 24 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck.
5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Sound-attenuation blankets.
3. Acoustical joint sealants.
4. Tile backing panels.

B. Related Requirements:

1. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
2. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
3. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Mold-resistant gypsum board, Type X.
2. Cementitious backer units.
3. Interior trim.
4. Aluminum trim.
5. Joint treatment materials.
6. Sound-attenuation blankets.
7. Acoustical sealant.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For ceiling and wall materials, indicating compliance with requirements for low-emitting materials.

C. Samples for Verification: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 MOCKUPS

A. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.

2. Apply or install final decoration indicated, including painting, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

C. Ceiling and wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

A. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Continental Building Products, LLC.
    c. Georgia-Pacific Gypsum LLC.
    d. National Gypsum Company.
    e. USG Corporation.
    f. Or approved equal.

2. Core: 5/8 inch, Type X.

3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

B. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Core: 5/8 inch, Type X.
2. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
3. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
4. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
5. Long Edges: Tapered.
6. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.

1. Long Edges: Tapered.

2.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation; Saint-Gobain North America.
b. Custom Building Products.
c. National Gypsum Company.
d. USG Corporation.
e. Or approved equal.

2. Thickness: As indicated.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Shapes:

a. Cornerbeads: For 90 degree external corners, structural laminate material.

1) Basis of Design Product: Subject to compliance with requirements, provide Certainteed; NO-COAT Outside 90 and flexible 450 degree at other corners or one of the following:

a) ClarkDietrich; Midflex.
b) Trim-Tex; Fast Edge.

c) Or approved equal.

b. Edge Beads: Structural laminate material, L-shaped; exposed long flange receives joint compound.

1) Basis of Design Product: Subject to compliance with requirements, provide Certainteed; NO-COAT 5/8 inch L-trim or comparable product by one of the following:

a) ClarkDietrich.
b) MarinoWARE.
c) Or approved equal.

c. Expansion (Control) Joint:

1) Basis of Design Product: Subject to compliance with requirements, provide USG; No. 0.093 or comparable product by one of the following:

a) Certainteed.
b) ClarkDietrich.
c) MarinoWARE.
d) Or approved equal.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Fry Reglet Corporation.
b. Gordon, Inc.
c. Pittcon Industries.
d. Or approved equal.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.9 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. VOC content:Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements.".
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from slag or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Everkem Diversified Products, Inc.
    b. Franklin International.
    c. Pecora Corporation.
    d. USG Corporation.
    e. Or approved equal.

2. Colors of Exposed Acoustical Joint Sealants: As selected by Commissioner from manufacturer's full range of colors.
3. VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements.".
4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Acoustically-Rated Assemblies: For partitions with sound attenuation blankets, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.4 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: Mold-resistant Type X.
2. Ceiling Type: Mold-resistant Type X.
3. Abuse-Resistant Type: Wall outside corners for a minimum distance of two (2) feet..
4. Type C: Where required for specific fire-resistance-rated assembly indicated.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.5 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile and thin set brick veneer.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Commissioner for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. U-Bead: Use where indicated.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: Where indicated on Drawings.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Floor tile.
2. Metal edge strips.
3. Tile backing panels.

B. Related Requirements:

1. Section 092900 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. Face Size: Actual tile size, excluding spacer lugs.

C. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Laboratory Test Reports: For sealers, indicating compliance with requirements for low-emitting materials.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square , but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required.
4. Metal edge strips in 6-inch lengths.

1.7 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product.

B. Product Test Reports: For tile-setting and -grouting products.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of wall tile installationof sufficient size to demonstrate each typical conditions.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

A. Wall Tile:

1. Product (Type CT-1): Subject to compliance with requirements, provide one of the following:

a. Daltile: Keystones.

1) Color: Mustard, D181, matte finish.
2) Size: 1 inch by 1 inch.

b. Nemo: Appiani. - Open Space.

1) Color: Siderite, OPS 4009.
2) Size: 1 by 1 inch.

c. Nemo: Viscaya Glass.

1) Color: Golden Rod, VG27M, matte finish.
2) Size: 1 inch x 1 inch.

d. Or approved equal.

2. Product (Type CT-2): Subject to compliance with requirements, provide one of the following:

a. Daltile: Keystones.

1) Color: Urban Putty Speckle, D201, matte finish.
2) Size: 1 by 1 inch.

b. Nemo: Appiani - Open Space.

1) Color: Zirconio, (OPS 4007).
2) Size: 1 by 1 inch.

c. Nemo: Lapis.

1) Color: Travertino.
2) Size: 1 inch x 1 inch.

d. Or approved equal.

3. Grout Color: As selected by Commissioner from manufacturer's full range.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: Refer to Section 092900 "Gypsum Board.".

2.5 WATERPROOF MEMBRANES

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.6 SETTING MATERIALS

A. Modified Dry-Set Mortar: ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Custom Building Products.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.
    d. Merkrete; a Parex USA, Inc. brand.
    e. SikaTile.
    f. Or approved equal.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

B. Improved Modified Dry-Set Mortar: ANSI A118.15.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Custom Building Products.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.
    d. Merkrete; a Parex USA, Inc. brand.
    e. SikaTile.
    f. Or approved equal.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

2.7 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. SikaTile.
e. Or approved equal.

2. Polymer Type:

a. Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; white zinc alloy exposed-edge material.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Schluter Systems L.P. profiles; Same Height Transition- Schiene, Slope Transitions- Reno-U, Outside Vertical Corners- Quadec or comparable product by one of the following:

a. Blanke Corporation.
b. Ceramic Tool Company, Inc.
c. Or approved equal.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Commissioner.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.4 INSTALLATION OF CERAMIC TILE

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.
    b. Tile floors consisting of tiles 8 by 8 inches or larger.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Glazed Wall Tile: 1/8 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Metal Edge Strips: Install at locations indicated.

3.5 INSTALLATION OF TILE BACKING PANELS

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.6 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.7 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.8 INTERIOR TILE INSTALLATION SCHEDULE

A. Install tile to comply with requirements indicated below for setting bed methods, TCNA installation methods related to types of subfloor construction, and grout types:

B. LHT and LFT Mortar: For large and heavy format tile floors unless otherwise indicated. Large format tiles have at least one side measuring 15 inches or more.

1. Use setting bed thickness in accordance with tile material manufacturers requirements.

C. Interior Wall Installations, Metal Studs or Furring:

1. TCNA W244C : Mortar on cementitious backer units .

a. Tile Type: As scheduled.
b. Mortar: Modified dry-set or Improved modified dry-set mortar.
c. Grout: High-performance grout.

END OF SECTION 093013

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

B. Related Requirements:

1. Section 092216 "Non-structural Metal Framing" for wood fiber and gypsum board ceiling support materials.
2. Section 092900 "Gypsum Board" for gypsum board panel requirements.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Panels, each type: Set of 6-inch- square Samples of each type, color, pattern, and texture.
2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.
3. Clips: Full-size seismic clips.

E. Engineering Services Submittal: For seismic restraints for ceiling systems.

1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

F. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.

    a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical panels.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:

    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
8. Minimum Drawing Scale: 1/4 inch = 1 foot .

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Ceiling products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design seismic restraints for ceiling systems.

C. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

D. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E 1264.
2. Smoke-Developed Index: 450 or less.

2.3 ACOUSTICAL PANELS

A. Panel Description: Acoustically transparent stipple-textured panels constructed of 6 to 7 lb./cu.ft. acoustically absorptive core, with a high acoustic performance layer laminated to the face. Panels must have coated extruded aluminum edges and a vapor barrier backing. Finish must be applied over the panel face and edges

B. Sole Source Product (AC-1): CertainTeed Corporation/Decoustics; Claro.

1. No Substitutions Permitted.

C. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

D. Classification: Provide panels as follows:

1. Type and Form: As indicated by manufacturers product designation.

E. Color: White.

F. Noise Reduction Coefficient (NRC): Not less than 0.90.

G. Edge/Joint Detail: Square.

H. Thickness: 1 1/16 inch.

I. Modular Size: As indicated on Drawings.

J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 ACOUSTICAL PANELS - BACK OF HOUSE

A. Panel Description: High NRC panels attached to in-direct hung suspension system. Panels are constructed of wood fibers bonded with inorganic hydraulic cement.

B. Basis-of-Design Product (ACT-1): Subject to compliance with requirements, provide Tectum by Armstrong World Industries, Inc. panels or one of the following:

1. Cardinal Acoustics; equivalent product.
2. Second Skin; timberwool.
3. Or approved equal.

C. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

D. Classification: Provide panels as follows:

1. Type and Form: Type XIV, Pattern F unless otherwise indicated by indicated by manufacturers product designation.

E. Color: White.

F. Noise Reduction Coefficient (NRC): Not less than 0.70.

G. Edge/Joint Detail: Tegular, Reveal sized to fit flange of exposed suspension-system members.

H. Thickness: 15/16 inch.

I. Modular Size: As indicated on Drawings.

2.5 METAL SUSPENSION SYSTEMS

A. Metal Suspension-System Standard: Provide manufacturer's standard, in-direct-hung (black iron), metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Description: Downwardly accessible torsion spring suspension system with integrated acoustical panel.

1. Basis-of-Design Product (AC-1): Subject to compliance with requirements, provide CertainTeed Corporation/Decoustics; Ceilencio or comparable product by one of the following:

a. Armstrong World Industries, Inc.
b. Chicago Metallic Corporation.
c. United States Gypsum Company.
d. Or approved equal.

D. Wood Fiber Board Ceilings (ACT-1):

1. Refer to Section 092216 "Non-structural Metal Framing" for other support materials.
2. Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation; with prefinished 15/16-inch wide metal caps on flanges.

a. Structural Classification: Intermediate -duty system.
b. End Condition of Cross Runners: Override (stepped) or butt-edge type.
c. Face Design: Flat, flush.
d. Cap Material: Cold-rolled steel.
e. Cap Finish: Painted white

2.6 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, "In-Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

B. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

C. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

E. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

F. Seismic Stabilizer Bars, where required by project application: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. Chicago Metallic Corporation.
4. Fry Reglet Corporation.
5. Gordon, Inc.
6. United States Gypsum Company.
7. Or approved equal.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.8 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 092900 "Gypsum Board."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.4 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
7. Do not attach hangers to steel deck tabs.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. Install panels with pattern as selected by the Commissioner.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
6. Install seismic clips according to panel manufacturer's written instructions unless otherwise indicated.
7. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.5 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: The City of New York Special will perform Special Inspections (Controlled Inspections) under a separate contract.

1. Periodic inspection during the installation of post-installed anchors for suspended ceiling grids according to 2014 NYC Building Code 1704.32.

B. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass inspections.

C. Prepare inspection reports.

3.7 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Vinyl base.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For sealants, indicating VOC content.
4. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For resilient base and stair products and accessories, indicating compliance with requirements for low-emitting materials.
6. Environmental Product Declaration: For each product.
7. Health Product Declaration: For each product.
8. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 VINYL BASE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
3. Johnsonite; A Tarkett Company.
4. Or approved equal.

B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style A, Straight: Provide in areas with carpet tile.

C. Minimum Thickness: 0.080 inch.

D. Height: 2-1/2 inches.

E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed.

H. Colors and Patterns: As selected by Commissioner from manufacturer's full color range.

2.3 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements.".

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.4 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. Preformed Corners: Install preformed corners before installing straight pieces.

G. Job-Formed Corners:

1. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter or cope corners to minimize open joints.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 096513

SECTION 096623 - RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Thin-set, epoxy-resin terrazzo flooring.
2. Precast epoxy-resin terrazzo units including stair treads and landings.

B. Related Requirements:

1. Section 057100 " Decorative Metal Stairs."
2. Section 079200 "Joint Sealants" for sealants installed with terrazzo.
3. 142123.16 "Machine Room-less Electric Traction Passenger Elevators.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to terrazzo including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
c. Review special terrazzo designs and patterns.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives and sealers, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Include terrazzo installation requirements. Include plans, sections, component details, and relationship to other work. Show layout of the following:

1. Divider strips.
2. Control-joint strips.
3. Accessory strips.
4. Abrasive strips.
5. Stair treads, risers, and landings.
6. Precast terrazzo jointing and edge configurations.
7. Terrazzo patterns.

D. Samples for Initial Selection:

1. Custom Mix/Colo(s)r: As selected by Commissioner.

E. Samples for Verification: For each approved type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo Sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare Samples of same thickness and from same material to be used for the Work, in sizes indicated below:

1. Terrazzo: 12-inch square Samples.
2. Precast Terrazzo: 12-inch square Samples.
3. Accessories: 12-inch long Samples of each exposed strip item required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each type of terrazzo material or product.

C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

D. Preinstallation moisture-testing reports.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For terrazzo to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications:

1. Engage an installer who is a contractor member of NTMA.

2. Installer shall be certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups for terrazzo including accessories.

a. Flooring Mockup: Minimum 100 sq. ft. of typical poured-in-place flooring in location as directed by Commissioner.

1) Remove mockup as directed by Commissioner

b. Precast Stair Tread Mockup: Minimum three stair treads.

1) Subject to compliance with requirements, approved mockup may become part of the final Work if undisturbed at the time of Substantial Completion.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.

B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.

C. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.

E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

B. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. NTMA Standards: Comply with NTMA's written recommendations for terrazzo type indicated unless more stringent requirements are specified.

B. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 EPOXY-RESIN TERRAZZO

A. Epoxy-Resin Terrazzo: Comply with manufacturer's written instructions for matrix and aggregate proportions and mixing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Key Resin Company.
b. Master Terrazzo Technologies LLC.
c. Sherwin-Williams Company, General Polymers.
d. Terrazzo & Marble Supply Companies.
e. Or approved equal.

B. Mix Color and Pattern: Match Commissioner's approved sample and as follows.

1. Color 1: Honey-Color Terrazzo:

a. Epoxy Matrix Color: Eider White 8328
b. Chips:

1) 30% - Size: 1, 2 – Italian Botticino
2) 10% - Size: 2 – CMOP (mother of pearl)
3) 10% - Size: 0, 1, 2 – Chocolate Glass
4) 20% - Size: 1, 2 – Pepper Harvest
5) 20% - Size: 1, 2 – Tuscan Cider

6) 10% - Size: 0, 1, 2 – Chocolate Heritage marble

c. Grit: 400.
d. Filler: ATF-20.
e. Sealer: WB Acrylic.

2. Color 2: Green Terrazzo:

a. Epoxy Matrix color: Eider White 8328
b. Chips:

1) 65% - Size: 0 (10%), 1 (35%), 2 (55%) - Verdi Alpi
2) 15% - Size: 0, 1, 2 - New Royal Green
3) 10% - Size: 1 (50%), 2 (50%) - Clear Plate Glass
4) 10% - Size: 1 (50%), 2 (50%) - Sea Green Glass

c. Grit: 400.
d. Filler: ATF-20.
e. Sealer: WB Acrylic.

C. Materials:

1. Moisture-Vapor-Emission-Control Membrane: Two-component, high-solids, high-density, low-odor, epoxy-based membrane-forming product produced by epoxy terrazzo manufacturer that reduces moisture emission from concrete substrate to not more than 3 lb of water/1000 sq. ft. in 24 hours.
2. Substrate-Crack-Suppression Membrane: Product of terrazzo-resin manufacturer, having minimum 120 percent elongation potential according to ASTM D 412.

a. Reinforcement: Fiberglass scrim.

3. Primer: Manufacturer's product recommended for substrate and use indicated.
4. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.

a. Physical Properties without Aggregates:

1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
2) Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
3) Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.

a) Distilled water.
b) Mineral water.
c) Isopropanol.
d) Ethanol.
e) 0.025 percent detergent solution.
f) 1.0 percent soap solution.
g) 5 percent acetic acid.

h) 10 percent sodium hydroxide.
i) 10 percent hydrochloric acid.
j) 30 percent sulfuric acid.

b. Physical Properties with Aggregates: For terrazzo blended according to manufacturer's recommendations with one part epoxy resin with three parts marble aggregate consisting of 60 percent No. 1 chips and 40 percent No. 0 chips that is ground and grouted to a 1/4-inch nominal thickness, and cured for 7 days at 75 deg F plus or minus 2 deg F and at 50 percent plus or minus 2 percent relative humidity.

1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch according to ASTM D 635.
2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F according to ASTM C 531.

5. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.

a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131/C 131M.
b. 24-Hour Absorption Rate: Less than 0.75 percent.
c. Dust Content: Less than 1.0 percent by weight.

6. Finishing Grout: Resin based.

2.4 PRECAST EPOXY-RESIN TERRAZZO

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Precast Terrazzo Enterprises, Inc.
2. Romoco Precast Terrazzo Products; a subsidiary of Roman Mosaic & Tile Company.
3. Wausau Tile Inc.
4. Or approved equal.

B. Precast Terrazzo Units : Comply with manufacturer's written instructions for fabricating precast units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer. Finish exposed-to-view edges and reveals to match face finish. Ease exposed edges as indicated on Drawings.

1. Color, Pattern, and Finish: Match Commissioner's sample, custom mix used for epoxy terrazzo flooring.
2. Thickness: As indicated on Drawings.

2.5 STRIP MATERIALS

A. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.

1. Bottom-Section Material: Matching top-section material.
2. Top-Section Material: White-zinc alloy.
3. Top-Section Width: 1/8 inch.

B. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:

1. Edge-bead strips for exposed edges of terrazzo.

C. Nosing Strips: Two-line stainless steel inserts as indicated on the Drawings.

1. Width: 1/8 inch.
2. Depth: As required by terrazzo thickness.
3. Length: As required to terminate 2 inches from each end of tread and landing.
4. Finish: #4 satin.

2.6 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.

1. VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements.".
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Anchoring Devices:

1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and as required for secure attachment to substrate.
2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.

C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

D. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

E. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.

F. Sealer where required: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; and is recommended by sealer manufacturer.

1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
2. Acid-Base Properties: With pH factor between 7 and 10.
3. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.3 PREPARATION

A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.

B. Concrete Slab:

1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.

    a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written instructions.
    c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.

C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

D. Preinstallation Moisture Testing:

1. Testing Agency: Engage a qualified testing agency to perform tests.
2. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Moisture-Vapor-Emission Test: Maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours when tested according to ASTM F 1869 using anhydrous calcium chloride.
    b. Relative Humidity Test: Maximum 75 percent relative humidity measurement when tested according to ASTM F 2170 using in-situ probes.

3. Proceed with terrazzo installation only after concrete substrates pass moisture testing or after installation of moisture-vapor-emission-control membrane on substrate areas that fail testing.

E. Moisture-Vapor-Emission-Control Membrane: Install according to manufacturer's written instructions.

1. Install on concrete substrates that incorporate lightweight aggregates.
2. Install concrete substrates that fail preinstallation moisture testing.

F. Substrate-Crack-Suppression Membrane: Install to isolate and suppress substrate cracks according to manufacturer's written instructions.

1. Prepare and prefill substrate cracks with membrane material.
2. Install membrane at substrate cracks in areas to receive terrazzo.
3. Reinforce membrane with fiberglass scrim.

G. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

H. Epoxy Terrazzo for Elevator Cabs:

1. After plywood is anchored,surface must be sanded to remove foreign matter from to open pores of the wood.
2. Joints must be filled with 4-inch wide band of a liquid epoxy membrane and fiberglass mesh placed over each joint.
3. Where used and required by enclosure size, angle divider strips can be positioned and anchored to the plywood with the epoxy material.

3.4 EPOXY-RESIN TERRAZZO INSTALLATION

A. Comply with NTMA's written recommendations for terrazzo and accessory installation.

B. Strip Materials:

1. Divider and Control-Joint Strips:

a. Locate divider strips in locations indicated.
b. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.

2. Accessory Strips: Install as required to provide a complete installation .
3. Nosing Strips: Install with surface of strip positioned 1/16 inch higher than terrazzo surface.

C. Apply primer to terrazzo substrates according to manufacturer's written instructions.

D. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions.

1. Installed Thickness: 3/8 inch unless otherwise indicated on Drawings nominal.
2. Installed Thickness for Elevator Cabs: 3/8 inch..
3. Terrazzo Finishing: Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.

    a. Rough Grinding: Grind with 24-grit or finer stones or with comparable diamond abrasives. Follow initial grind with 60/80-grit stones or with comparable diamond abrasives.
    b. Grouting: Before grouting, clean terrazzo with water, rinse, and allow to dry. Apply and cure epoxy grout.
    c. Fine Grinding/Polishing: Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted. Grind with 80 -grit stones or with comparable diamond abrasives until grout is removed from surface.

4. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet; noncumulative.

E. Install and finish poured-in-place terrazzo stair platform at the same time the adjacent terrazzo flooring is installed.

3.5 PRECAST TERRAZZO INSTALLATION

A. Install precast terrazzo units using method recommended in writing by NTMA and manufacturer unless otherwise indicated.

1. Joints: Units must be installed with methods to create a seamless appearance.

B. Do not install units that are chipped, cracked, discolored, or improperly finished.

3.6 REMEDIATION

A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Commissioner.

3.7 CLEANING AND PROTECTION

A. Cleaning:

1. Remove grinding dust from installation and adjacent areas.
2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.

B. Sealing:

1. Seal surfaces according to NTMA's written recommendations.
2. Apply sealer according to sealer manufacturer's written instructions.

C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 096623

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Modular carpet tile.

B. Related Requirements:

1. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples for Initial Selection: For each type of carpet tile.

1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.

D. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

E. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An experienced installer who is approved by carpet tile manufacturer.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 FIELD CONDITIONS

A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

    a. More than 10 percent edge raveling, snags, and runs.
    b. Dimensional instability.
    c. Excess static discharge.
    d. Loss of tuft-bind strength.
    e. Loss of face fiber.
    f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Bentley Mills; Vertex- Style: 4VX22, Custom color- Kings Road- Blonder 880374 and two other colors as selected by Commissioner with Backing- NexStep Cushion, 24 by 24 inch or one of the following:

1. Mannington Mills, Inc.Bouclé with Backing- Evolve II, 24 by 24 inch; Custom Color- Sunset 52286 and two other colors as selected by Commissioner.
2. Shaw Contract Group; a Berkshire Hathaway company; Clearing 5T381 with Cushion Backing: Ecologix Tile, 9 by 36 inch; Custom color- 56.10 percent - 5725D Butterscotch, 43.90 percent - 5478D Butter56.10 percent - 5725D Butterscotch, 43.90 percent - 5478D Butter and two other colors as selected by Commissioner.
3. Or approved equal.

B. Color(s): As selected Commissioner.

C. Pattern: As indicated by selected manufacturers product designation.

D. Fiber Content: 100 percent nylon 6, 6.

E. Fiber Type: As indicated by selected manufacturers product designation.

F. Pile Characteristic: Level-loop pile.

G. Yarn Twist: As indicated by selected manufacturers product designation.

H. Yarn Count: As indicated by selected manufacturers product designation.

I. Density: As indicated by selected manufacturers product designation.

J. Pile Thickness: As indicated by selected manufacturers product designation for finished carpet tile according to ASTM D6859.

K. Stitches: As indicated by selected manufacturers product designation.

L. Gage: As indicated by selected manufacturers product designation.

M. Surface Pile Weight: As indicated by selected manufacturers product designation.

N. Total Weight: As indicated by selected manufacturers product designationfor finished carpet tile.

O. Secondary Backing: Manufacturer's standard material.

P. Size: As indicated on drawings Finish Schedule.

Q. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.
2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:

    a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

R. Sustainable Design Requirements:

1. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

S. Performance Characteristics:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D7330.
2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
3. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.
4. Tuft Bind: Not less than 10 lbf according to ASTM D1335.
5. Delamination: Not less than that indicated by selected manufacturers product designation according to ASTM D3936.
6. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
9. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

1. VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements.".
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Metal Edge/Transition Strips: Extruded aluminum with finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.4 INSTALLATION

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive unless otherwise recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns indicated on Drawings and as recommended in writing by carpet tile manufacturer.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Finish coatings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Environmental Product Declaration (EPD): For each product.
3. Health Product Declaration (HPD): For each product.
4. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
5. Manufacturer Inventory: For each product, provide manufacturer's manifest of ingredients.

C. Samples: For each type of topcoat product.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each paint product from single source from single manufacturer.

B. Products: Refer to Part 3 Exterior Painting Schedule.

2.2 PAINT PRODUCTS, GENERAL

A. VOC Content: For field applications, paints and coatings shall comply with VOC content limits: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."

B. Colors: As selected by Commissioner from manufacturer's full range.

2.3 PRIMERS

A. Water-Based, Galvanized-Metal Primer: Corrosion-resistant, pigmented, acrylic primer; formulated for use on cleaned/etched, exterior, galvanized metal to prepare it for subsequent water-based coatings.

B. Epoxy Metal Primer: Corrosion-resistant, solvent-based, two-component epoxy primer formulated for use on prepared, exterior ferrous- and galvanized-metal surfaces.

2.4 FINISH COATINGS

A. Exterior Latex Paint, Semigloss: Water-based, pigmented emulsion coating formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as masonry, portland cement plaster, and primed wood and metal.

1. Gloss Level: Manufacturer's standard semigloss finish.

B. Exterior Alkyd Enamel, Semigloss: Solvent-based, pigmented, alkyd enamel formulated for mold, microbial, and water resistance and for use on exterior, primed, wood and metal surfaces.

1. Gloss Level: Manufacturer's standard semigloss finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.

D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.4 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in a lawful manner.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Commissioner, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Ferrous Metal, Galvanized and Non-galvanized (Non-Decorative):

1. EP-1: Acrylic, semi-gloss Finish: 2 finish coats.

a. Basis of Design Product: Subject to compliance with requirements, provide Benjamin Moore & Co.; Super Spec High Performance DTM Acrylic Semi-gloss, HP29 or comparable by one of the following:

1) Pittsburgh Paints.
2) Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
3) Sherwin-Williams Company (The).
4) Or approved equal.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Floor sealers and paints.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Commissioner will select one surface to represent surfaces and conditions for application of each paint system.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    b. Other Items: Commissioner will designate items or areas required.

2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Commissioner at no added cost to City of New York.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each paint type from single source from single manufacturer.

B. Products: Refer to Part 3 Interior Painting Schedule.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."

C. VOC Emissions: For field applications inside the building, wall paints shall contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit or 33 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.

D. Colors: As selected by Commissioner from manufacturer's full range.

2.3 PRIMERS

A. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

B. Interior Latex Primer Sealer: Water-based latex sealer used on new interior plaster, concrete, and gypsum wallboard surfaces.

2.4 WATER-BASED FINISH COATS

A. Interior, Latex, High-Performance Architectural Coating, Low Sheen (Flat) for Ceilings: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

B. Interior, Latex, High-Performance Architectural Coating, Eggshell for Walls: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

C. Interior, Latex, High-Performance Architectural Coating, Semigloss for Doors, Frames, Woodwork and where indicated: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Fiber-Cement Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.4 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work unless otherwise indicated.

1. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in a lawful manner.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Commissioner, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Flat Acrylic Finish: 2 finish coats over a primer.

a. P-1, Ceilings: First and Second Coats: Flat, acrylic-latex-based, interior paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.5 mils.

1) Basis of Design Product: Subject to compliance with requirements, provide Moore: Regal Select Interior–Matte 548 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

b. P-2, Walls:First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading raterecommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Regal Select Eggshell 549 or Pearl 550 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

B. Woodwork: Provide the following paint finish systems over new, interior wood surfaces:

1. P-4: Semigloss, Alkyd-Enamel Finish: 2 finish coats over a primer.

a. Primer: Alkyd or latex-based, interior enamel undercoater applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Basis of Design Product: Subject to compliance with requirements, provide Benjamin Moore & Co.; N023 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

b. First and Second Coats: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Advance 793 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

C. Ferrous Metal not classified as AESS: Provide the following finish systems over ferrous metal:

1. P-5: Acrylic, semi-gloss 2 coats Finish.

a. Primer:

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Super Spec High Performance DTM Acrylic Semi-gloss or comparable by one of the following:

b. Satin, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Satin Impervo #314 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

D. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

1. P-6: Semigloss, Acrylic-Enamel Finish: 2 finish coats over primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Basis of Design Product: Subject to compliance with requirements, provide Benjamin Moore & Co.; Super Spec High Performance DTM Acrylic Semi-gloss HP29 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

2. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

a. Basis of Design Products: Subject to compliance with requirements, provide Regal AquaGlo Vinyl-Acrylic Latex Enamel or comparable by one of the following:

1) Pittsburgh Paints.
2) Sherwin-Williams Company (The).
3) Or approved equal.

E. Concrete and Concrete Unit Masonry: Provide one of the following finish systems:

1. Factory-formulated high-performance latex block fillers. Applied at a dry film thickness of not less than 8.1 mils.

a. Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Avove 571 or comparable by one of the following:

1) Pittsburgh Paints.
2) Sherwin-Williams Company (The)
3) Or approved equal.

2. P-7: Eggshell Acrylic Latex Finish; 2 finish coats over primer.

a. Prime Coat:

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Regal First Coat Primer and underbody or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

b. Finish Coat(s):

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Regal Select 3 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The)..
c) Or approved equal.

3. P-8: High Gloss Waterbourne Epoxy (Heavy Service Wear): 2 finish coats over primer:

a. Prime Coat:

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Block Filler 571;or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal..

b. Finish Coats :

1) Basis of Design Products: Subject to compliance with requirements, provide Benjamin Moore & Co.; Benjamin Moore & Co.; V440or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

F. Concrete Floor at Entrance Grille: Provide one of the following finish systems.

1. P-9: Waterbourne Acrylic Epoxy (Heavy Service Wear): 2 finish coats over primer:

a. Clear Penetrating Sealer: Clear resin/rubber copolymer complying with ASTM C309, Type 1; applied in 2 coats.

1) Basis of Design Products: Subject to compliance with requirements, provide Euclid Chemical Co.; FloorCoat or comparable by one of the following:

a) Benjamin Moore & Co.
b) Pittsburgh Paints.
c) Or approved equal.

b. Primer: Alkali-resistant, exterior, acrylic-latex primer applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 1.4 mils:

1) Polyurethane Reinforced Alkyd: 2-3 coats.
2) Basis of Design Product: Subject to compliance with requirements, provide Benjamin Moore & Co.; N023 or comparable by one of the following

a) Pittsburgh Paints
b) Sherwin-Williams Company (The).
c) Or approved equal.

c. Top-Coat:

1) Basis of Design Product: Subject to compliance with requirements, provide Benjamin Moore & Co.; IMC Acrylic Epoxy V440 or comparable by one of the following:

a) Pittsburgh Paints.
b) Sherwin-Williams Company (The).
c) Or approved equal.

G. P-10: Concrete Floor at Back-of-House and where indicated:

1. Products: Subject to compliance with requirements, provide one of the following finish systems.

a. Benjamin Moore & Co.; Clear acrylic sealer, V027.
b. Pittsburgh Paints; Perma-Crete Plex-Seal 4-6200.
c. Sherwin-Williams Company (The);.Armorseal Tread-Plex Finish• , B90 series.
d. Or approved equal.

H. Specialty Industrial Coating for Architectural Exposed Ferrous Metal and Ornamental assemblies:

1. Repair and touch-up painted surfaces of Stair #1 and spray-apply third coat in accordance with Section 051213"Architecturally Exposed Structural Steel Framing."

END OF SECTION 099123

SECTION 101100 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Glass markerboards.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
2. Include electrical characteristics for motorized units.

B. Sustainable Design Submittals:

1. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For visual display units.

1. Include plans, elevations, sections, details, and attachment to other work.

D. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes, and as follows:

1. Samples of facings for each visual display panel type, indicating color and texture.
2. Actual factory-finish color samples, applied to substrate for back painting.

E. Samples for Verification: For each type of visual display unit indicated.

1. Visual Display Panel: Not less than 8-1/2 by 11 inches, with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
2. Support System: 6-inch- long sections.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each visual display unit, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For visual display units to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by manufacturer.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical visual display unit as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 GLASS MARKERBOARDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Bendheim; Mag+ Projectable Magnetic Dry-Erase Glass Marker Board or comparable product by one of the following:

1. Goldray Glass; Goldray Industries.
2. McCrory Glass, Inc.
3. Or approved equal.

B. Glass Markerboards: Fabricated of 6-mm tempered-laminated, low-iron, glass with steel interlayer for use with magnets.

1. Edge Treatment: Smooth polished edge with eased corners.
2. Surface: Matte.
3. Custom Color for back-painting: As selected by Commissioner.

C. Mounting: Manufacturer's proprietary Z-clip system or alternate system approved by Manufacturer.

D. Size: As indicated on drawings.

2.2 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.

B. Examine walls and partitions for proper preparation and backing for visual display units.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.

C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.

D. Finish wall surfaces indicated to receive visual display units and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.

3.4 INSTALLATION

A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Field-Assembled Visual Display Board Assemblies: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
2. Where size of visual display board assemblies or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Commissioner from manufacturer's standard structural support accessories to suit conditions indicated.

3.5 CLEANING AND PROTECTION

A. Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.

B. Cover and protect visual display units after installation and cleaning.

C. Replace any damaged units prior to time of Substantial Completion.

END OF SECTION 101100

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Building identification signs inclusive of the following and as included in Signage Package drawings list of sign types (Cover Sheet SG000) and Signage Schedule SG200:

a. Exterior stainless steel characters (letters and numbers); pin-mounted to aluminum substrate.
b. Interior stainless steel characters (letters and numbers); pin-mounted to aluminum substrate.
c. Interior stainless steel characters (letters and numbers); set in millwork.
d. Field-applied, vinyl character signs.
e. Interior aluminum panel signs.
f. Acrylic panel signs and inserts.
g. Other aluminum panel signs as indicated.

1) Mission Statement.
2) Art Statement.
3) Dedication plaque.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

B. Tactile: Tactile characters designed to be read by touch without abrasive or sharp edges.

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product used.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For each type of sign and character.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

D. Samples for Initial Selection: For each type of sign and character assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

E. Samples for Verification: For each type of sign and character assembly showing components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. For each type of sign and character: Not less than 12 inches square including corner.
2. For each type of character, letters and numbers: Manufacturers standard size.
3. For each type of Field-Applied, Vinyl-Character Sign: Full-size Sample of characters on glass.
4. Exposed Accessories: Sample of each accessory type.

F. Product Schedule: For each type of sign and location. Use same designations indicated on Signage Package drawings.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of sign to include in maintenance manuals.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are properly trained and approved by sign manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009.

2.2 DIMENSIONAL CHARACTERS

A. Description: Cutout characters, letters and numbers, with uniform faces; square-cut, smooth, eased edges; precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. A.R.K. Ramos.
b. ASI Sign Systems, Inc.
c. InPro Corporation (IPC).
d. Southwell Company (The).
e. Or approved equal.

B. Character Material: Sheet or plate stainless steel.

C. Character Height: As indicated on Signage Package drawings.

D. Thickness: As indicated on Signage Package drawings.

E. Finishes:

1. Integral Stainless-Steel Finish: No. 4 unless otherwise indicated or selected by Commissioner.

F. Mounting: As indicated on drawing and details.

G. Typeface: As indicated on Signage Package drawings.

2.3 FIELD-APPLIED, VINYL-CHARACTER SIGNS

A. Field-Applied, Vinyl-Character Sign : Prespaced characters die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.

1. Description: Digitally reverse, white opaque vinyl.

B. Basis-of-Design Manufacturers: Subject to compliance with requirements, provide products as supplied by 3M or comparable product by one of the following:

1. Mohawk Sign Systems.
2. Seton Identification Products.
3. Or approved equal.

C. Size: As indicated on Signage Package drawings.

D. Substrate: Glass and as indicated on Signage Package drawings.

E. Text and Font: As indicated onSignage Package drawings.

2.4 ALUMINUM PANEL SIGNS

A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ASI Sign Systems, Inc.
b. Best Sign Systems, Inc..
c. InPro Corporation (IPC).
d. Seton Identification Products.
e. Or approved equal.

B. Solid-Sheet Sign and Returns, Returns, and Back: Aluminum sheet and as follows:

1. Thickness: As indicated on Signage Package drawings.
2. Surface-Applied, Graphics, Letters and Numbers: Tactile polymer characters and raised tactile for Braille.
3. Surface-Applied, Flat Graphics: Paint and baked enamel/powder coat as indicated for sign type or as selected by Commissioner.
4. Sign-Panel Perimeter: Finish edges smooth.

a. Edge Condition: Square unless otherwise indicated on Drawings.
b. Corner Condition in Elevation: As indicated on drawing and details.

5. Mounting: Manufacturer's standard method for substrate indicated, with hook-and-loop tape, or magnetic tape unless otherwise indicated on Signage Package drawings.

6. Surface Finish and Applied Graphics: Use the following as indicated or selected by the Commissioner.

    a. Baked-Enamel or Powder-Coat Finish and Graphics: RAL color(s) as indicated on Drawings.
    b. Painted Finish and Graphics: Factory-applied exterior-grade sign paint, in RAL color(s) as indicated on Drawings.
    c. Overcoat: Manufacturer's standard baked-on clear coating.

7. Text and Typeface: As indicated on Signage Package drawings including accessible raised characters and Brailleas indicated on Signage Package drawings.
8. Flatness Tolerance: Sign shall remain flat or uniformly curved under installed conditions as indicated on Drawings and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.5 ACRYLIC PANEL SIGNS AND INSERTS

A. Solid-Sheet: Clear Acrylic sheet and as follows as selected by the Commissioner:

1. Thickness: As indicated on Signage Package drawings.
2. Etched and Filled Graphics: Sign face etched or routed to receive enamel-paint infill.
3. Inset, Cutout Characters: Sign face routed to receive characters flush with the sign panel.

B. Mounting: As indicated on Signage Package drawings.

2.6 SIGN MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316 for exterior use and Type 304 for interior use; stretcher-leveled standard of flatness.

C. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

D. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.

E. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.7 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:

1. Use concealed fasteners and anchors unless indicated to be exposed.

2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.

3. Sign Mounting Fasteners:

a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.

B. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report based on ICC-ES AC01 ICC-ES AC193 ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.

1. Type: Torque-controlled, expansion anchor or adhesive anchor.
2. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

C. Adhesive: As recommended by sign manufacturer.

1. Adhesives VOC content: Refer to DDC General Conditions Section 018113.04 Sustainable Design Requirements for LEED v4 Buildings for VOC Requirements."
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Hook-and-Loop Tape: Manufacturer's standard two-part tape consisting of hooked part on sign back and looped side on mounting surface.

E. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.8 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

C. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

D. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:

1. For snap-in changeable inserts beneath removable face sheet, furnish one suction or other device to assist in removing face sheet. Furnish initial changeable insert. Furnish two blank inserts for each sign for City of New York's use.
2. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Furnish two blank inserts for each sign for City of New York's use.

E. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color color unless otherwise indicated.
2. Stainless-Steel Brackets: Factory finish brackets with No. 4 finish unless otherwise indicated.

2.9 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.10 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Verify that anchorage devices embedded in permanent construction are correctly sized and located to accommodate signs.

D. Verify that electrical service is correctly sized and located to accommodate signs.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.

C. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrate: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

2. Hook-and-Loop Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply sign component of two-part tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage; push to engage tape adhesive. Keep tape strips 0.250 inch away from edges to prevent visibility at sign edges when sign is initially installed or reinstalled. Apply substrate component of tape to substrate in locations aligning with tape on back of sign; push and rub well to fully engage tape adhesive to substrate.
3. Magnetic Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position.
4. Shim-Plate Mounting: Provide 1/8-inch- thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using one of mounting methods specified above.

D. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

E. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.4 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Commissioner.

END OF SECTION 101400

SECTION 102813 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Hand dryers.
3. Childcare accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Samples: For each exposed product and for each finish specified, full size.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

D. Engineering Services Submittal: For grab bars.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Jumbo-Roll) Dispenser:

1. Sole Source Product: Bobrick Washroom Equipment, Inc.; B-2890

   a. No Substitutions Permitted.

2. Description: One-roll unit.
3. Mounting: Surface mounted.
4. Capacity: Up to10-inch diameter rolls.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Lockset: Manufactures standard system.
7. Refill Indicator: Pierced slots at front.

B. Paper Towel (Roll) Dispenser:

1. Sole Source Product: Bobrick Washroom Equipment; Product Code B-2860.

   a. No Substitutions Permitted.

2. Description: Pull-towel actuated mechanism permitting controlled delivery of paper rolls in preset lengths.
3. Mounting: Surface mounted.
4. Minimum Capacity: 8-inch- wide, 950-foot-long roll.
5. Material and Finish: ABS plastic, white with clear window or black with translucent window, as selected by Commissioner.
6. Lockset: Key-activated spring lock or push-button operation, as selected by Commissioner.
7. Emergency feed knob.

C. Waste Receptacle:

1. Sole Source Product: Bobrick Washroom Equipment, Inc.; B-279.

   a. No Substitutions Permitted.

2. Mounting: Surface mounted.
3. Minimum Capacity: 6.4 gallons.
4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
5. Construction. All-welded; top edge hemmed and bottom with recessed finger grip. Equipped with four spot-welded interior hooks for attaching the vinyl liner.
6. Liner: Reusable (removable) vinyl liner.

   a. Manufacturers standard vinyl with four grommets.

D. Circular Waste Receptacle:

1. Sole Source Product: Bobrick Washroom Equipment, Inc.; B-2400.

    a. No Substitutions Permitted.

2. Description: Floor-standing large capacity with funnel top.
3. Outside Diameter: 18 1/4 inches.
4. Height: 32 inches.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Waste Container: Galvanized steel with wire handle. Removable for servicing. Capacity: 33-gallon.

E. Soap Dispenser:

1. Sole Source Product: Bobrick Washroom Equipment, Inc.; Trim Line Series, B-26637.

    a. No Substitutions Permitted.

2. Description: Designed for manual operation and dispensing soap in lather form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 1000 ML.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Lockset: Manufactures standard system.
7. Refill Indicator: Window type.

F. Grab Bar:

1. Sole Source Product: Bobrick Washroom Equipment, Inc.; B-5806 series.

    a. No Substitutions Permitted.

2. Mounting: Flanges (snap-type) with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area.

4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: Straight, 36 inches long.

G. Sanitary-Napkin Disposal Unit:

1. Sole Source Product: TOUGH GUY as supplied by Grainger, Item #/Mfr. Model 1ECK9.

    a. No Substitutions Permitted.

2. Mounting: Surface mounted or free-standing where indicated.
3. Door or Cover: River-type disposal-opening cover.
4. Receptacle: Removable.

5. Size: 11 inches high by 9 inches wide by 4 1/4 inch deep.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

H. Seat-Cover Dispenser:

1. Sole Source Product: Bobrick Washroom Equipment, Inc.; B-221 Classic series.

    a. No Substitutions Permitted.

2. Description: Dispenses single- or half-fold paper toilet seat covers from beveled opening. Dispenser fills from bottom through concealed opening.
3. Mounting: Surface mounted.
4. Minimum Capacity: 250 seat covers.
5. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

I. Mirror Unit:

1. Sole Source Product: Bobrick Washroom Equipment, Inc.; B-290 2436.

    a. No Substitutions Permitted.

2. Design: Snap Locking or "2S" Tab as selected by Commissioner.
3. Frame: Stainless steel angle, 0.05 inch thickwith continuous integral stiffener on all sides and beveled front to hold frame tightly against mirror.

    a. Corners: Welded and ground smooth.

4. Size: As indicated on Drawings.

5. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

2.3 HAND DRYERS

A. Warm-Air Dryer:

1. Sole Source Product: World Dryer Corporation; SLIMdri 485D17, L-973 cover.

    a. No Substitutions Permitted.

2. Description: Warm-air hand dryer with 140 mph speed/ 70 cfm air flow, and 48 degree F temperature rise.
3. Unit size: 10.7 by 11.43 by 3.9 inches.
4. Mounting: Surface mounted.

    a. Protrusion Limit: Installed unit protrudes maximum 4 inches from wall surface.

5. Operation: Infrared-sensor activated with timed power cut-off switch.

    a. Automatic Shutoff: Manufacturers standard.

6. Maximum Sound Level (dB): Manufacturers standard.
7. Cover Material and Finish: Stainless steel, ASTM A480/A480M, Brushed.
8. Electrical Requirements: 115 V, 8.3 A, 950W 208 to 240 V, 3.7 or 4.1 A, 775 or 950 W.

2.4 CHILDCARE ACCESSORIES

A. Diaper-Changing Stations:

1. Sole Source Product: Koala Kare Products; a Division of Bobrick; KB11-SSWM.

    a. No Substitutions Permitted.

2. Description: Horizontal unit with stainless steel veneer that opens by folding down from stored position and with child-protection strap.

    a. Engineered to support minimum of 250-lb static load when opened.

3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), exterior shell with rounded plastic corners; interior made from injection-molded polypropylene with antimicrobial additive embedded into the bed surface.

    a. Color: Grey or white granite as selected by Commissioner.

2.5 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.

B. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

C. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

D. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.6 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to City of New York

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

3.3 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION 102813

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets.

1.3 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire-protection cabinets, including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets.

1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For each type of exposed finish required.

D. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches square.

E. Product Schedule: For fire-protection cabinets. Indicate whether recessed or semirecessed, Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ; Embassy" series, Vertical Duo, with concealed door pull, Model 5614V17 or comparable product by one of the following:

    a. Fire-End & Croker Corporation.
    b. Larsens Manufacturing Company.
    c. Potter Roemer LLC; a Division of Morris Group International.
    d. Or approved equal.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Cold-rolled steel sheet.

D. Recessed Cabinet:

1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box, to act as drywall bead.

E. Door Material:

1. FEC-1: Steel sheet, painted white finish.
2. FEC-2: Stainless steel sheet, satin finish.

F. Door Style: Vertical duo with glazing panel, without frame.

G. Door Glazing: Tempered float glass (clear).

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide recessed door pull and friction latch.
2. Provide continuous hinge, of same material and finish as trim,manufacturer's standard hinge, permitting door to open 180 degrees.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

J. Materials:

1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.

    a. Finish: Factory primed for field painting.
    b. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.

   a. Finish: ASTM A480/A480M No. 4 directional satin finish,.

3. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames of one-piece construction with edges flanged.
2. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.4 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights approved by Commissioner.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets.
2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.5 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Buckeye Fire Equipment Company.
b. Fire End & Croker Corporation.
c. Kidde; Carrier Global Corporation.
d. Potter Roemer LLC; a Division of Morris Group International.
e. Or approved equal.

2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
3. Valves: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type in Steel Container : UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

C. Multipurpose Dry-Chemical Type in Aluminum Container : UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-aluminum container.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install fire extinguishers in locations indicated and in compliance with requirements of the Commissioner.

END OF SECTION 104416

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Standard duty metal lockers as indicated on the Drawings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For metal lockers.

1. Include plans, elevations, sections, and attachment details.
2. Show locker trim and accessories.
3. Include locker identification system and numbering sequence.

D. Samples: Manufacturer's color charts showing the full range of colors available.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.9 COORDINATION

A. Coordinate sizes and locations of bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for Metal Lockers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: For lockers indicated to be accessible, comply with ICC A117.1-2009.

2.2 STANDARD METAL LOCKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hadrian Manufacturing Inc.
2. Lyon Workspace Products, LLC.
3. Penco Products, Inc.
4. Republic Storage Systems, LLC.
5. Or approved equal.

B. Locker Sizes:

1. Width: 12 inches.
2. Depth: 18 inches
3. Height: As indicated on Drawings.

C. Doors: One piece; fabricated from 0.060-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
2. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch nominal-thickness steel sheet; welded to inner face of doors.
3. Door Style: 6-inch louvered openings at top and bottom.

D. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops, Bottoms, and Intermediate Dividers: 0.060-inch (1.52-mm) nominal thickness, with single bend at sides.
2. Backs and Sides: 0.048-inch1.22-mm) nominal thickness, with full-height, double-flanged connections.
3. Shelves: 0.048-inch (1.22-mm) nominal thickness, with double bend at front and single bend at sides and back.

E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.

F. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.

G. Door Handle and Latch for Box Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.

H. Locks: Padlocks by End User.

I. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

J. Hooks: Manufacturer's standard ball-pointed hooks, aluminum or steel; zinc plated.

K. Materials:

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

L. Finish: Baked enamel or powder coat.

1. Color: As selected by Commissioner from manufacturer's full range.

2.3 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Equipment: Provide each locker with an identification plate and the following equipment:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.

D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

G. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.4 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
2. Anchor metal lockers to walls near top and bottom of lockers.

B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.

C. Equipment:

1. Attach hooks with at least two fasteners.
2. Attach door locks on doors using security-type fasteners.
3. Identification Plates: Identify metal lockers with identification indicated on Drawings.

    a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
    b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.

3.4 ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

3.5 PROTECTION

A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113

SECTION 107523 - WALL-MOUNTED FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes

1. Wall-mounted flagpoles made from aluminum.
2. Flags.

B. Related Requirements:

1. Section 264113 "Lightning Protection for Structures" for connecting wall-mounted metal flagpoles to lightning protection system.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For flagpoles.

1. Include plans, elevations, and details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
2. Include details of wall-mounted connections and mountings.

C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

D. Engineering Services Submittal: For flagpoles.

1. Include loads, point reactions, and locations for attachment of flagpoles to building's structure.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 COORDINATION

A. Coordinate installation of anchorages for flagpoles. Furnish setting drawings, templates, and directions for installing anchorages that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Where pole lighting is used, coordinate Division 26 Electrical requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design flagpole assemblies.

B. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.

1. Wind Loads: Determine according to NAAMM FP 1001.
2. Base flagpole design on nylon flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: Entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Acme/Lingo Flagpoles LLC.
b. American Flagpole; a Kearney-National Inc. company.
c. Concord Industries, Inc.
d. Pole-Tech Company Inc.
e. Or approved equal.

B. Exposed Length: 45 feet.

C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

D. Vertical Wall Mount: Custom aluminum mounting bracket complete with escutcheon, mounting plate and through-wall anchorage as indicated on the drawings.

1. Finish: Same as flagpole.

2.4 FITTINGS

A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

1. 0.063-inch spun aluminum with silver anodic finish.

B. Internal Halyard, Cam Cleat System: 5/16-inch- diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

1. Halyard Flag Snaps: Nylon swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.

2.5 FLAGS

A. Material for flag shall be weather resistant, premium nylon, UV resistant fabric. All seams shall be locked stitched reinforced for maximum durability. Stars shall be precision embroidered or sewn appliqued.

1. Flag size: 8 by12 feet.

2.6 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44.

1. Color: Silver.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Mounting Brackets: Anchor brackets securely to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION 107523

SECTION 113013 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cooking appliances.
2. Refrigeration appliances.
3. Cleaning appliances.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Sustainable Design Submittals:

1. ENERGY STAR: Product Data for indicated products, showing compliance with requirements for ENERGY STAR product labeling.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of appliance.

B. Field quality-control reports.

C. Sample Warranties: For manufacturers' special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of residential appliance from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with applicable provisions in the USDOJ's 2010 ADA Standards for Accessible Design and ICC A117.1-2009.

2.3 MICROWAVE OVENS

A. Microwave Oven:

1. Basis-of-Design Product: Subject to compliance with requirements, provide GE Profile: PES7227SLSS or one of the following:

    a. LG Electronics; #LMC2075BD.
    b. Whirlpool Corporation; #WMC50522HZ.
    c. Or approved equal.

2. Mounting: Countertop.
3. Type: Conventional.
4. Dimensions:

    a. Width: As indicated by selected manufacturers product designation.
    b. Depth: As indicated by selected manufacturers product designation.
    c. Height: As indicated by selected manufacturers product designation.

5. Capacity: 2.0 cu. ft..
6. Oven Door: Door with observation window and pull handle .

7. Exhaust Fan: -speed fan, Nonvented, recirculating type with non-removable charcoal filter and with manufacturer's standard capacity.
8. Microwave Power Rating: 1100 W minimum.
9. Electric Power Supply: 120 V, 60 Hz, 1 phase, 13 A.
10. Controls: Digital panel controls and timer display.
11. Material: Stainless steel.

2.4 REFRIGERATOR/FREEZERS

A. Refrigerator/Freezer: Two-door refrigerator/freezer with freezer on top and complying with AHAM HRF-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sub-Zero, Inc. (Sub-Zero and Wolf); Model # DET3050CIID or one of the following:

    a. Liebherr; #HCB 1581.
    b. Miele, Inc.; #KF2812VI.
    c. Or approved equal.

2. Type: Freestanding.
3. Dimensions:

    a. Width: 30 inches.
    b. Depth: As indicated by selected manufacturers product designation.
    c. Height: As indicated by selected manufacturers product designation.

4. Storage Capacity:

    a. Refrigeration Compartment Volume: 10.3 cu. ft..
    b. Freezer Volume: 4.9 cu. ft.
    c. Shelf Area: Three adjustable glass shelves, 26 sq. ft..

5. General Features:

    a. Door Configuration: Overlay.
    b. Built-in water-filtration system.
    c. Dual refrigeration systems.

6. Refrigerator Features:

    a. Interior light in refrigeration compartment.
    b. Compartment Storage: Vegetable crisper.
    c. Door Storage: Modular compartments.

7. Freezer Features: Two freezer compartment(s) configured as pull-out drawer(s).

    a. Automatic defrost.
    b. Interior light in freezer compartment.
    c. Automatic icemaker and storage bin.

8. Front Panel(s): Panel(s) to match cabinets.
9. Pulls: Refer to Section 064116 "Plastic Laminate-clad Architectural Cabinets."

2.5 REFRIGERATORS

A. Refrigerator: One-door unit and complying with AHAM HRF-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Liebherr #UR500 or one of the following:

    a. Marvel; #MARE224-IS51A.
    b. Summit; #FF7LBLKBIIFADA.
    c. Or approved equal.

2. Type: ADA compliantand Undercounter with cabinet door cover panel.
3. Dimensions:

    a. Width: As indicated by selected manufacturers product designation.
    b. Depth: As indicated by selected manufacturers product designation.
    c. Height: As indicated by selected manufacturers product designation.

4. Storage Capacity: 4.6 cu. ft. minimum.
5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
6. Receptacle: 3-prong grounding-type.
7. Electrical Supply: 115 VAC, 60 Hz.
8. Electrical Service: 15 amp dedicated circuit.
9. Front Panel: Matching cabinets as determined by Commissioner.
10. Pulls: Refer to Section 064116 "Plastic Laminate-clad Architectural Cabinets."

2.6 DISHWASHERS

A. Dishwasher : Complying with AHAM DW-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Bosch #SGV78B53UC or one of the following:

    a. Fisher & Paykel Appliances Limited; #DW24U6I1.
    b. Miele, Inc.; #G5051SCVI.
    c. Or approved equal.

2. Type: ADA compliant, Built-in undercounterwith cabinet door cover panel.
3. Dimensions:

    a. Width: 24 inches.
    b. Depth: 23 inches.
    c. Height: Must fit under ADA compliant countertop.

4. Capacity:

a. Water Consumption for Full Load: 3.2 gal. per cycle.

5. Sound Level: Maximum 42 dB.
6. Tub and Door Liner: Stainless steel with sealed detergent and automatic rinsing-aid dispensers.
7. Rack System: -Coated sliding dish racks, with removable cutlery basket.
8. Controls: Touch-pad controls with wash cycles and hot-air and heat-off drying cycle options.
9. Features: As standard with selected product.
10. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
11. Front Panel: Panel to match cabinets.
12. Pulls: Refer to Section 064116 "Plastic Laminate-clad Architectural Cabinets."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install appliances according to manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

3.4 FIELD QUALITY CONTROL

A. Perform the following inspections with the assistance of a factory-authorized service representative:

1. Perform visual, mechanical, and electrical inspection for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Operational Test: After installation, start units to confirm proper operation.
3. Adjust controls and safeties. Replace damaged and malfunctioning controls and components.

B. An appliance will be considered defective if it does not pass tests and inspections.

C. Prepare inspection reports.

END OF SECTION 113013

SECTION 115116 - BOOK DEPOSITORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Exterior-use self return kiosk.
2. Interior-use self return kiosk.
3. Book check.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, and details for installation.
2. Detail installation of kiosk systems, including methods of anchoring to building structures at locations recommended by manufacturer.

C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For book depositories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by product manufacturer.

C. Product Options: Information on Drawings and in Specifications establishes minimum requirements for performance characteristics of assemblies to be used.

1. Other manufacturers products will be considered, as judged solely by Commissioner. If changes are proposed, submit comprehensive explanatory data to Commissioner for review.

1.8 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of book depository, conveyors, and check-out systems that fail in within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of metal finishes and other materials beyond normal wear.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Description: Each kiosk must have barrier free functionalities by means of specially designed easy-to read fonts and voice guidance. Color LED lights (green/red) located near the hatch door will give clear indications what the patrons need to do to make the return process go smoothly.

2.2 MANUFACTURERS

A. Sole Source Products:

1. Kiosk: Lyngsoe Systems; Library Mate 2100 for exterior use and Library Mate 1200 for interior use.
2. Book Check: Bibliotheca; Self-check 1000.
3. Book Conveyor: Lyngsoe Systems; Sortmate 2000.

B. No Substitutions Permitted.

2.3 EXTERIOR KIOSK

A. Dimensions Front: 41.3 inches high by 26.4 inches wide.

1. Tunnel 2000: 31.5 inches long; at maximum angle: 7 degrees.

B. Shelf: 9.8 inches deep by 26.4 inches wide.

C. Materials: Steel wall-plate front and aluminum shelf-plate front.

D. Screen: 17 inch color touch screen.

E. Standard color(s): As selected by Commissioner from the following.

1. Aluminum.
2. Black.

2.4 INTERIOR KIOSK

A. Dimensions, Large front: 28 inches high by 20 inches wide.

1. Tunnel 2000: 31.5 inches long; at maximum angle: 7 degrees.

B. Screen: 19 inch color touch screen.

C. Standard colors: As selected by Commissioner from the following.

1. Front plate: Green (RAL 6025/Brilliance 70).
2. Shelf: Storm (RAL 7015).

2.5 KIOSK FUNCTIONALITY

A. Power 100-240 V AC 50-60 Hz

B. Network connection: Wired Ethernet.

C. Capacity Up to 1,100 items/hour.

D. Suitable for receiving: Library materials, Books, magazines, CD/DVDs and similar.

1. Item restrictions Item size:

a. Minimum: 4 inches long by 4 inches wide by 1 inch high.
b. Maximum: 15.8 inches long by 11.8 inches wide by4inches high.

2. Item weight:

a. Min: 30 g / 1 oz.
b. Max: 5 kg / 11 lbs.

E. For use with LMS/ILS using SIP standard interface protocols.

F. Sorters: Lyngsoe Sort Mate 1000 and 2000 sorter series.

G. Software: Library Mate software communicating with the ILS/LMS.

H. Software: IMMS for control of floating collections and reservations.

I. RFID: Danish data mode.

2.6 MANUFACTURERS OPTIONS FOR KIOSK

A. Provide the following as selected by Commissioner:

1. Stand-alone or connected to Sort Mate sorter.
2. Magnet patron card reader.
3. RFID patron card reader.
4. Barcode patron card reader.
5. Open door by RFID in shelf.
6. Item barcode overhead reader.
7. Item RFID reader.
8. Camera kit.

2.7 BOOK CHECK

A. Description: Freestanding unit with shelf.

B. Physical Characteristics: As indicated by selected manufacturers product designation.

C. Custom color(s): As selected by Commissioner.

2.8 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ACCESSORIES

A. Floor Anchors: Galvanized steel, post-installed expansion anchors orthreaded concrete screws.

B. Wall Anchors: Manufacturer's standard galvanized-steel anchors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install each kiosk unit at locations indicated in accordance with approved shop drawings and manufacturer's written instructions.

B. Level and plumb kiosk units to manufacturer's required tolerance.

3.4 CLEANING AND PROTECTING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Commissioner.

C. Protect installed products from damage during remainder of the construction period.

END OF SECTION 115116

SECTION 115119 - BOOK THEFT PROTECTION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Security gate entry system for books and other library media, including antenna panels, electronics modules and other required components for a complete system.
2. System accessories, including but not limited to desensitizer/resensitizers, and detection strips.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer’s product data sheets and installation instructions.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Indicate electrical rough-in dimensions, service connection details, and the location of field connections.
3. Indicate required clearances for equipment service and operation.
4. Include wiring diagrams detailing wiring for power and control systems differentiating clearly between manufacturer-installed wiring and field-installed wiring. Indicate conduit and raceways required.

C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For library stack systems to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are properly trained and approved by manufacturer.

1.8 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of book theft protection systems that fail in within specified warranty period.

B. Warranty Period: 10 years from date of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products of this Section as recommended by the manufacturer to prevent damage.

PART 2 - PRODUCTS

2.1 SECURITY SYSTEM, GENERAL

A. Description: System shall have both audible and visible alarms to signal unauthorized removal of books or other library media. Volume and tone of alarm shall be adjustable.

B. Electromagnetic Security System: Uses digital signal processing technology. System shall detect electromagnetic security tags and be compatible with all existing electromagnetic tagged library collections. System shall automatically reset after any alarm incidents. System shall enable aisle width up to 5’-0” wide distance between antenna panels. All cabling of the system, including accessories, shall be included.

C. System must meet Barrier Free Accessibility (ADA) requirements.

2.2 MANUFACTURERS

A. Sole Source Products: Feig Electronics; 690 Crystal Gate Excellence.

1. No Substitutions Permitted.

2.3 SYSTEM COMPONENTS AND ACCESSORIES

A. Detection system; including detector antenna panels, electronics modules, connecting cables, and fittings and accessories required for a completely functional system.

1. Provide single or multiple aisle configurations as indicated on the Drawings, with the required number of antenna panels.
2. System voltage: 110V.

B. Include one of each the following as applicable to project application:

1. Workstation Combination Desensitizer/ Resensitizer Verifier.
2. Desktop Deactivator, non-electric.
3. Magnetic Media Deactivator/Reactivator.
4. Book sensitizer, portable wand, with battery recharger.

C. Include 1000 of each the following unless otherwise required by project application:

1. Book detection strips, double adhesive, 6 1/2 inch, for books and magazines.
2. Security strips for hardcover books, 5 inch, single adhesive.
3. Security strip kit for audio/video tapes, .3 1/2 inch..
4. Security strips for CD and CD-ROM, 3 1/2 inch.

2.4 ACCESSORIES

A. Floor Anchors: Galvanized steel, post-installed expansion anchors or threaded concrete screws.

B. Wall Anchors: Manufacturer's standard galvanized-steel anchors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for areas to receive system components. Verify that critical dimensions are correct and that conditions are acceptable.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install security gate entry system at locations indicated on drawings in accordance with approved shop drawings and manufacturer's written instructions.

B. Set each component of work securely and accurately, level and properly aligned with other components and other work.

C. Securely anchor antenna panels to concrete floor slab.

D. Assemble, install, connect, and adjust all components, to make system fully operational and ready for use.

3.4 FIELD QUALITY CONTROL

A. Engage the services of a factory-authorized service representative to be on-site during installation of systems being installed.

B. Test and adjust equipment. Make necessary adjustments for proper operation of equipment.

3.5 DEMONSTRATION

A. Startup Services: Engage the services of a factory-authorized service representative to provide startup service and demonstration and to instruct personnel for system operation.

B. Schedule training with the personnel through the Commissioner, with at least 7 days advance notice.

C. Instruct the operational personnel in proper use and maintenance of the system.

D. Review data in products "Operating and Maintenance Manual."

3.6 CLEANING AND PROTECTING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Protect installed products from damage during remainder of the construction period.

END OF SECTION 115119

SECTION 115123 -LIBRARY STACK SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cantilever fixed shelving units.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cantilever fixed shelving units and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Show clear-aisle widths from face of units.
3. Detail fabrication and installation of fixed shelving units, including methods of anchoring them to building structures at locations recommended by manufacturer and as required for seismic restraint.

C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Design Calculations: For seismic design of cantilever fixed shelving units, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

B. Qualification Data: For Installer.

C. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For cantilever fixed shelving units to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of cantilever fixed shelving units that fail within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of metal finishes and other materials beyond normal wear.

2. Warranty Period: Life of Installation from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Design cantilever metal storage shelving, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of New York, using performance requirements and design criteria indicated.

1. Load-Carrying Capacity per Shelf: 50 pounds per square foot without deflection in excess of 3/16 inch unless otherwsie indicated and required indicated on Drawings, uniformly distributed.
2. Deflection: Maximum allowable sub floor deflection of L/480 under specified storage loads.

B. Seismic Performance: Library stack systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Sustainable Design Performance:

1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.2 CANTILEVER-HUNG FIXED METAL SHELVING

A. Steel-Bracket Shelving: ANSI Z39.73 shelving designed for library use, units consisting of two uprights and two spreaders per section forming a four-sided frame, with adjustable shelves on one or both sides of uprights cantilever-hung by brackets or shelves spanning between independent supporting sheet metal end panels that allow shelf-height adjustment over full height of shelving unit. Include fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.

B. Sole Source Products: Montel Inc.; Aetnastak Cantilever Library Shelving System.

1. No Substitutions Permitted.

2.3 MANUFACTURED COMPONENTS – CANTILEVER SHELVING

A. Frames:

1. Uprights: Steel channels, Nominal 0.060 inch thick(16 gage) , with slots to receive shelf bracket tabs at 1 inch o.c.

a. Fabricated from cold-rolled steel channel shape with 1/2 inch stiffening flanges, 2 inch web with 1 5/16 inch front and rear faces; smooth, closed box shape 2 by 2 5/8 inch in cross section with eight right angle bends when bolted to the adjoining column of the next unit, or bolted to an end cover. Each column is perforated full height on both faces with a row of slots spaced 1 inch on vertical centers to receive hooks and lugs of shelf brackets, permitting adjustment of shelves. Two (2) uprights are required for each section of a range.
b. Sloped Display Frames: Where indicated, provide upright post frames with additional steel angles, 0.060 inch thick(16 gage) , 36 inches high, slotted to receive shelving and welded to frame or gusset plates at 10-degree angle to allow better visibility of lower two shelves.

2. Top Spreader: Tube steel, Nominal 0.060 inch thick(16 gage); 2 by 2 inch fully closed steel tube.
3. Bottom Spreader Channel: 0.0713 inch (14 gage) steel; electric welded on the two (2) vertical faces with continuous welds to the upright. Slots in bottom spreader channel are provided to perform leveling functioncolumns at a height to assure continuous through shelving on the base shelves.
4. Longitudinal Bracing: Provide one intermediate spreader for each of three units in each range of shelving.
5. Reinforcing Gusset Plates: Triangular steel plates, 0.060 inch thick, with return flange along bottom edge.

B. Shelves, General: Formed with front and rear faces box-formed, 3/4 inch with no less than four (4) 90-degree bends. Surface of bottom shelf flush with top surface of the bottom spreader. Side flanges of the base shelf must engage formed lugs in the base shelf support and securely to render full-support to the side surfaces of the shelf. Two (2) piece base shelves are used for double face units to provide flexibility for future rearrangement from double face to single face.

C. Adjustable Shelves: Nominal 0.048-inch- thick (18 gage) cold-rolled steel sheet. Provide two brackets per shelf; 0.060-inch- thick (16 gage)cold-rolled steel.

D. Base Shelves: One-piece shelves, Nominal 0.048-inch- thick (18 gage) cold-rolled steel sheet, designed to receive and fit snugly around uprights, with kick plate 3 inches high. Provide two brackets per base shelf; 0.060-inch- thick (16 gage) cold-rolled steel sheet, with return flange along bottom edge. Provide perforated bases at locations where base shelves cover supply-air grilles.

E. Shelf-Divider Slots where indicated: 2 inches o.c..

F. Levelers, General: Adjustable pin levelers at carpeted surfaces and adjustable glides elsewhere.

1. Nominal 0.1130 inch thick (11 gage); threaded steel clip welded to each frame upright below bottom channel spreader to accommodate 5/16 inch leveling glide.

G. Base Shelf Bracket: Nominal: 0.060 inch thick (16 gage) steel; with front and top faces flanged on 5/16 inch radius and exposed corner smoothly rounded. Brackets must have three (3) projections at rear, two (2) hooks at top and right-angle tab at the bottom with a hole to accept a 5/16 inch bolt.

H. Adjustable Shelf Bracket: Nominal: 0.60 inch thivk (16 gage) steel; same construction as base bracket. Impression is furnished to serve as an automatic bracket spacer, eliminating the possibility of adjacent bracket overlap. Bracket design allows shelf adjustment upward or downward without disturbing adjacent shelves.

I. Gusset: Nominal: 0.60 inch thick (16 gage) steel; one piece a , 32 or 48 inch high, triangular 2 inch at top and depth of base at bottom; 1 1/2 inch bend with holes allows anchoring to floor.

J. End Panels: Provide where indicated.

1. Fabricated from cold-rolled steel sheet; patterned where indicated.
2. Steel Sheet Thickness, Nominal: 0.048 inch (18 gage).

K. Back Panels for single-faced units: Provide one-piece panels at each single-faced unit; 0.048-inch-(1.22-mm-) thick (18 gage) cold-rolled steel sheet, with smooth or patterned finish, sized to completely fill space between uprights.

L. Canopy Tops: Provide where indicated with manufacturer's standard attachment brackets for type of top indicated.

1. Steel Top Panels: Cold-rolled steel sheet, 0.048 inch thick(18 gage), with smooth finish.

2.4 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard two-coat, baked-on finish, consisting of prime coat and thermosetting topcoat to achieve a minimum dry film thickness of 2 mils .

1. Color and Gloss: As selected by Commissioner from manufacturer's full range.

2.6 ACCESSORIES

A. Floor Anchors: Galvanized steel, post-installed expansion anchors threaded concrete screws.

B. Top Bracing: Minimum 1- by 1-3/4-inch transverse struts, 0.048-inch- thick(18 gage) steel channels, welded or bolted to top of stack units and securely fastened to structure.

C. Filler Panels, where indicated: Provide filler panels; 0.048-inch- thick (18 gage) cold-rolled steel, with fitted caps, in color and finish to match shelving. Locate where indicated to fill gaps at abutting shelving units.

D. Findable Book Supports: Unattached book support, 6 inches high, with cork pad on bottom, for use on shelf surface.

1. Provide two per shelf.

E. Adjustable Shelf Dividers: One-piece, steel shelf partitions, with hooks or tabs to fit in slots in divider shelves.

1. Provide five per shelf.

F. Center Backstops for double-faced steel shelving: Adjustable steel shelf backstops, 0.048 inch thick, with stiffening flanges and hooks for attachment to uprights.

1. Provide one per shelf.

G. Shelf Label Holders: Clear plastic, 5 inches long, designed to snap over adjustable shelves.

H. Adhesive Shelf Label: Blank labels, 3/4 inch high, backed with pressure-sensitive adhesive for direct attachment to shelf.

1. Provide one per shelf.

I. Cardholders: Sized to hold 3-by-5-inch cards.

1. Provide one for single-faced units and two for double-faced units at each end of each range.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Vacuum finished floor over which shelving is to be installed.

3.4 INSTALLATION

A. Install library stack systems at locations indicated on Drawings and according to manufacturer's written instructions.

B. Enclosure Panels: Install end panels and canopy tops with concealed fasteners.

C. Level and plumb bookstack units to a tolerance of 1/8 inch in 96 inches .

D. Filler Panels: Install filler panels where indicated to fill gaps at abutting shelving units.

E. Install shelves at locations indicated and at spacing indicated or, if not indicated, at equal spacing in each unit.

3.5 ANCHORAGE

A. Bookstack Anchorage: Install bookstacks using floor anchors, wall anchors, or top bracing in locations recommended by manufacturer and as indicated on Shop Drawings.

3.6 CLEANING AND PROTECTING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Commissioner.

C. Protect installed products from damage during remainder of the construction period.

END OF SECTION 115123

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Motor-operated, single-roller shades.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than 10 inches square. Mark interior face of material if applicable.
2. Installation Accessories: Full-size unit, not less than 10 inches long.

E. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of shadeband material.

B. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Fabricator of products.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Commissioner of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain roller shades from single source from single manufacturer.

2.2 MOTOR-OPERATED, SINGLE-ROLLER SHADES

A. Basis-of-Design Manufacturers: Subject to compliance with requirements, provide products as supplied by Lutron Electronics Co., Inc. or comparable product by one of the following:

1. Draper Inc.
2. MechoShade Systems, Inc.
3. Or approved equal.

B. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Electric Motor: Manufacturer's standard tubular, enclosed in roller.

    a. Electrical Characteristics: 12-V dc unless otherwise indicated by selected manufacturers product designation.
    b. Maximum Total Shade Width: As required to operate roller shades indicated.
    c. Maximum Shade Drop: As required to operate roller shades indicated.
    d. Maximum Weight Capacity: As required to operate roller shades indicated.

3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide one of the following for remote-control activation of shades as selected by Commissioner:

    a. Keyed Control Station: Keyed, momentary-contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station.
    b. Individual/Group Control Station: Momentary-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.
    c. Sun Sensor Control: Adjustable system consisting of digital displays detecting sun intensity and responding by automatically adjusting shades.

d. Infrared Control: System consisting of concealed receiver complete with external eye and connecting modular cable and portable, multiple-channel transmitters with separate buttons to open and close individual or groups of shades, to open and close shades simultaneously, and to stop shade movement.

1) Capacity: Up to 12 individual or groups of shades.

e. Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
f. Color: As selected by Commissioner from manufacturer's full range.

4. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
5. Operating Features:

a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
b. Capable of interface with audiovisual control system.
c. Capable of accepting input from building automation control system.
d. Override switch.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: As indicated on Drawings.
2. Direction of Shadeband Roll: Reverse, from front (interior face) of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

D. Shadebands:

1. Shadeband Material: Dual-sided fabric with the following colors.

a. Exterior side: Charcoal.
b. Interior side: Oyster.

2. Shadeband Bottom (Hem) Bar: Extruded aluminum.

a. Type: Half-wrapped with charcoal fabric facing facing outside and anodized aluminum on interior.
b. Color and Finish: As selected by Commissioner from manufacturer's full range.

E. Installation Accessories:

1. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than height indicated on Drawings.
b. Provide pocket with lip at lower edge to support ceiling panel.

2. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.

   a. Closure-Panel Width: Custom clip as indicated on Drawings.

3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Stain and fade resistant.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Phifer; SheerWeave, Style 2703 or comparable product by one of the following:

   a. Hunter Douglas.
   b. MechoShade Systems, Inc.
   c. Or approved equal.

2. Type: 36 percent fiberglass and 64 percent vinyl on fiberglass.
3. UV Blocking: Approximately 97 percent.
4. Thickness: 0.028 inches.
5. Weight: 14 oz./sq. yd.
6. Roll Width: As required by project application to provide shades without seams.
7. Orientation on Shadeband: As selected by Commissioner.
8. Openness Factor: 3 percent.
9. Color: P28 Oyster (Interior) and Charcoal (Exterior).

2.4 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass unless otherwise indicated and required by project application. Allow clearances for window operation hardware.

B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

C. Roller Shade Locations: As indicated on Drawings.

3.4 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.5 CLEANING AND PROTECTION

A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Commissioner, before time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate motor-operated roller shades.

END OF SECTION 122413

SECTION 124816 - ENTRANCE FLOOR GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Recessed floor grilles and frames.

B. Related Requirements:

1. Section 099123 "Interior Painting" for waterproofing of entrance floor grille recess.

1.3 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance floor grilles and frames.

B. Shop Drawings:

1. Items penetrating floor grilles and frames, including door control devices.
2. Divisions between grille sections.
3. Perimeter floor moldings.

C. Samples: For the following products, in manufacturer's standard sizes:

1. Floor Grille: Assembled section of floor grille.
2. Frame Members: Sample of each type and color.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor grilles and frames to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 FIELD CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide C/S Group; Gridline 2 (G62) or comparable product by one of the following:

1. Kadee Industries, Inc.; Equivalemt product.
2. Nystrom, Inc;.eleGRIL.
3. Or approved equal.

2.2 ENTRANCE FLOOR GRILLES, GENERAL

A. Structural Performance: Provide floor grilles and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:

1. Wheel load of 1,000 lbs. per wheel.

B. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009.

2.3 FLOOR GRILLES

A. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs (if any) and other components needed to produce a complete installation.

B. Linear Grid-Type Floor Mats: Stainless-Steel Floor Grille: Type 304.

1. Surface Treads: 0.140-by-0.125-inch wire with inch wide openings between wires.
2. Stainless steel U-clip support structure (Support Rods): Spaced 0.187-inch o.c., welded to each wire.
3. Pit Grating: 1-1/8 inches deep.

4. Stainless-Steel Finish: Mill.
5. Grille Size: As indicated.

C. Lockdown: Hidden.

D. Floor grille must be removable to allow cleaning of substrate.

2.4 FRAMES

A. Provide manufacturer's standard frames of size and style for grille type, for permanent recessed installation in subfloor, complete with installation anchorages and accessories. Unless otherwise indicated, fabricate frame of same material and finish as grilles.

2.5 SUPPORT SYSTEM

A. Drainage Pit Applications: Provide manufacturer's special deep-pit frame and support extrusion system with intermediate support beams, sized and spaced as recommended by manufacturer for indicated spans and equipped with vinyl support cushions.

2.6 MATERIALS

A. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.

B. Stainless-Steel Flat Bars: ASTM A 666, Type 304.

C. Stainless-Steel Angles: ASTM A 276 or ASTM A 479/A 479M, Type 304.

2.7 FABRICATION

A. Shop fabricate floor grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.

B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

2.8 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

3. Directional Satin Finish: ASTM A480/A480M No. 4.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of floor grilles and frames.

B. Examine roughing-in for drainage piping systems to verify actual locations of piping connections before floor grille and frame and drain pan installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Apply waterproofing in accordance with Section 071419 "Cold Fluid-applied Waterproofing where indicated and required by project application.

B. Install recessed floor grilles and frames to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set floor-grille tops at height for most effective cleaning action.

C. Coordinate top of floor-grille surfaces with doors that swing across grilles to provide clearance under door.

3.4 PROTECTION

A. After completing frame installations, provide temporary filler of plywood or fiberboard in floor-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124816

SECTION 142123.16 - MACHINE ROOM-LESS ELECTRIC TRACTION PASSENGER ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Machine-room-less electric traction passenger elevators.

B. Products Supplied but Not Installed Under this Section:

1. Hoist Beam.

C. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
2. Section 051200 "Structural Steel Framing" for the following:

    a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
    b. Installation of hoist beams.
    c. Structural-steel shapes for subsills.

3. Section 055000 "Metal Fabrications" for the following:

    a. Attachment plates and angle brackets for supporting guide-rail brackets.
    b. Structural-steel shapes for subsills.
    c. Pit ladders.
    d. Cants made from steel sheet in hoistways.

4. Section 064216 "Flush Wood Paneling" for wood wall panel requirements in car enclosures.
5. Section 096623 "Resinous Matrix Terrazzo Flooring" for finish flooring in elevator cars.
6. Division 27 sections for smoke detectors in elevator lobbies to initiate emergency recall operation, for heat detectors in shafts and machine rooms to disconnect power from elevator equipment before or on sprinkler activation, and for connection to elevator controllers.

1.3 DEFINITIONS

A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
2. Include Product Data for car enclosures, hoistway entrances, and operation, control, and signal systems.

B. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, relationships with other construction, and locations of equipment.
2. Include large-scale layout of car-control station.
3. Service connections.
4. Door operator details.
5. Door closer details.
6. Car top inspection station details.
7. Entrance details.
8. Sill support details.
9. Fixture details including car lanterns, hall pushbutton stations, car operating panel, etc.
10. Wiring diagrams.
11. Insert diagrams.
12. Cab details including wall, ceiling, base, handrail, lighting, fixtures, front return and transom plans and sections.
13. Show the location of all required structural connections in the hoistway for the guide rails and the method of attachment to the walls and structure.
14. Calculations for the following:

    a. Rail loads
    b. Pit reactions
    c. Heat emissions in machine room
    d. Electrical loads including starting, accelerating and running currents. Include all auxiliary loads.
    e. Buffer loads and all reactions.
    f. Submit design calculations identifying seismic design forces and support capacities, certified by a professional engineer licensed in the State of New York.

15. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples for Initial Selection: For each type of exposed finish involving color selection.

D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.

1. Mitered, corner construction of entrance frame.
2. Each fixture requested by the Commissioner.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.

C. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway and pit layout and dimensions, as indicated on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. Submit manufacturer's or Installer's standard operation and maintenance manual, according to ASME A17.1/CSA B44 including diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
2. Include checklist of maintenance items (monthly-quarterly-half yearly-annual) and lubrication points, wiring diagrams (as-builts), instructions, and cuts or photographs of controller.

B. Inspection and Acceptance Certificates and Operating Permits: As required by the provisions of the 2014 NYC Building Code for normal, unrestricted elevator use.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Properly trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.10 COORDINATION

A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Coordinate locations and dimensions of work specified in other Sections that relates to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways and pits.

C. Coordinate subflooring requirements with finish flooring material specified.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in within specified warranty period.

1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide KONE Inc.; Machine Room-Less gearless traction elevator or comparable product by one of the following:

1. Otis Elevator Co.
2. ThyssenKrupp.
3. Or approved equal.

B. Source Limitations: Obtain elevators from single manufacturer.

1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.

B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1-2009.

C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator seismic requirements in ASME A17.1/CSA B44.

2.3 ELEVATORS

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system and as required to meet specified requirements.

B. Elevator Performance

1. Contract Speed: The contract speed shall be provided for "UP" direction travel with full load in the elevator car. The speed in either under any load condition shall not vary more than 3% of the contract speed.
2. Contract Capacity: In accordance with ASME A17.1 Code, elevators shall be designed and adjusted to safely lower, stop and hold the car with a load of 125% of the rated capacity.
3. Leveling Accuracy: The elevator shall be adjusted to provide accurate leveling within ¼" + the floor level without re-leveling regardless of load.
4. Ride Quality:

    a. Vertical Vibration (maximum): 12 milli-g.
    b. Horizontal Vibration (maximum): 12 milli-g.
    c. Vertical Jerk (maximum): 4.59 ± 1.0 ft./ sec3 (1.4 ± 0.3 m/ sec3).
    d. Acceleration/Deceleration (maximum): 1.64 ft./ sec2 (0.5 m/ sec2).
    e. Guide rails, roller guides, acceleration, deceleration and stopping of Elevator shall be adjusted so as not to exceed the following readings:

        1) Speed: Less than 600 fpm.
        2) 0 to Peak: 3.5 milli (g) acceleration, deceleration, full speed, and stop.
        3) Peak to Peak: 10 milli (g) acceleration, deceleration, full speed, and stop.

    f. In Car Noise: 55 - 60 dB(A).
    g. Stopping Accuracy: ± 0.5 in. (± 12 mm) max, ± 0.25 in. (± 6 mm) Typical.
    h. Re-leveling Distance: ± 0.5 in. (± 12 mm).

5. Door Opening Time: Seconds from start of opening to fully open -1.2
6. Door Closing Time: Seconds from start of closing to fully closed - 1.2
7. Car Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are 3/4 open and car level and stopped at next successive floor under any loading condition or travel direction (based on a 12'-0" floor to floor height) - 8.6.

8. The Contractor shall make changes or additions to the equipment, subject to the approval of Commissioner, necessary to meet the specified performance.

C. Acoustical Performance

1. When operating under normal conditions the elevator equipment shall not exceed a level of NC-40 in adjacent spaces when measured at a distance of not more than 5 feet from a wall or floor/ceiling assembly. This shall include spaces adjacent to machine rooms and elevator shafts. In addition, no vibration shall be perceptible under the same conditions in tenant spaces. For the or purposes of this specification, vibration shall be considered acceptable provided it is less than 8000 micro-inches per second. In order to achieve these standards, the following are required as a minimum:

    a. Hoist motors and secondary deflector sheaves shall be mounted on a unitized base supported on vibration isolation in the form of neoprene pads providing at least 0.35 inches of static deflection.
    b. Transformers shall be provided with vibration isolation pads sized for 0.35-inch static deflection. Transformers greater in capacity than 150 kVA shall be supported on spring isolators with minimum 1-inch static deflection. Provide a loop in the connecting electrical conduit and/or support resiliently with appropriate neoprene isolators. Do not wall support such equipment without isolation.
    c. Elevator controllers shall be provided with vibration isolation pads sized for 0.10-inch static deflection.
    d. Provide elevator car and counterweight with high quality, low noise, guide wheels with rubber tires.

2. Provide effective sound isolation between machines, secondary deflector sheaves, solid state motor drive units, chokes and filters from building structure to reduce noise transmission to adjoining spaces and Elevator cabs.

    a. Pure tones, defined as a sound level in any one-third octave band which is greater than 5db above adjacent one-third octave bands in the range of 45 to 11,200 Hz, are not acceptable.

3. Provide the following as a minimum:

    a. Resiliently isolate the entire machine base and transformers and filter units from the building structure by means of effective neoprene-in-shear isolators having a minimum static deflection of ½".
    b. Isolate the car hitch plates by means of isolation compression pads designed to provide 1/8-inch deflection under dynamic loading.
    c. Mount solid state rectification units on neoprene-in-shear isolators having a minimum static deflection of ½".
    d. Provide effective electrical filter/reactance to limit electrical noise.
    e. Fasten conduits and electrical connections to and/or support from Elevator machinery or solid-state rectification units by approved flexible connections.

D. Elevator Description:

1. Rated Load: 4500 lb.
2. Rated Speed: 150 fpm.

3. Horsepower :(hp):15.0.
4. Operation System: Simplex.
5. Auxiliary Operations:

    a. Standby power operation.
    b. Automatic operation of lights and ventilation fans.

6. Security Features: Keyswitch operation.
7. Car Enclosures:

    a. Inside Width: 67 3/16 inches from side wall to side wall.
    b. Inside Depth: 96 1 7/8 inches from back wall to front wall (return panels).
    c. Inside Height: 101 inches to underside of ceiling.
    d. Cab Height: 108 inches.
    e. Front Walls (Return Panels): Satin stainless steel, ASTM A480/480M, No. 4 finish.
    f. Car Fixtures: Satin stainless steel, ASTM A480/480M, No. 4 finish.
    g. Side and Rear Wall Panels: Wood veneer panels.
    h. Reveals: Satin stainless steel, ASTM A480/480M, No. 4 finish.
    i. Door Sills: Aluminum.
    j. Handrails: As indicated on the drawings.
    k. Subflooring: Tongue and groove plywood as per para, 2.7B.1.a. this section, required for field-installed terrazzo flooring as specified in Division 09 section.
    l. Ceiling and Base: Satin stainless steel, ASTM A480/480M, No. 4 finish.

8. Hoistway Entrances:

    a. Width: 48 inches.
    b. Height: 96 inches.
    c. Type: Two-speed side sliding.
    d. Stainless steel doors and frames with custom trim: Satin stainless steel, ASTM A480/480M, No. 4 finish .
    e. Sills: Aluminum.

2.4 TRACTION SYSTEMS

A. Elevator Machines: Permanent magnet, variable-voltage, variable-frequency, ac-type hoisting machines and solid-state power converters.

1. Provide regenerative system that complies with the IgCC.
2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
3. Provide means for absorbing regenerated power when elevator system is operating on standby power.
4. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

B. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

C. Machine Beams: Provide steel framing to support elevator hoisting machine and deflector sheaves from the building structure.

D. Car Frame and Platform: Bolted- or welded-steel units.

E. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

A. Manufacturer's standard microprocessor operation system: Simplex Collective Operation using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

1. Zoned Car Parking.
2. Relative System Response Dispatching.
3. Standard Operating Features to include:

    a. Fan and Light Control.
    b. Top of Car Inspection Station.

4. Basis-of-Design Product: Subject to compliance with requirements, provide KONE Inc.; KCM831 or comparable product by one of the following:

    a. Otis Elevator Co.
    b. ThyssenKrupp.
    c. Or approved equal.

B. Controller: Microcomputer-based control system including the following:

1. High voltage,110V or larger; contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
3. Provide a serial cardrack and main CPU board containing a non- erasable EPROM and operating system firmware.
4. Variable field parameters and adjustments shall be contained in a non- volatile memory module.

C. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.

D. Control Space: Locate controller in the front wall integrated with the top landing entrance frame, machine side of the elevator. One non-fused three phase permanent power in hoist way at top landing. A separate control space is not required

E. Auxiliary Operations:

1. Single-Car Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby. Manual operation causes automatic operation to cease.
2. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after five minutes and are re-energized before car doors open.

F. Security features shall not affect emergency firefighters' service.

1. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car-control stations. Key is removable in either position.

2.6 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

A. Provide enameled or powder-coated steel car enclosures to receive removable wall panels, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.

B. Materials and Finishes: Manufacturer's standards, but not less than the following:

1. Subfloor:

a. Exterior, A/C grade, tongue-in-groove plywood, 1-1/4 inch nominal thickness, attached to enclosure steel deck using screws and adhesive.
b. Joints where provided must be per NTMA Installation Guidelines: Longer joints (8 ft. side typically) butting adjacent sheets should be spaced 1/8 to 1/4 inch apart and shorter joints , space should be 1/16 to 1/8 inch (4 ft. side typically).

2. Floor Finish (Field-installed):

a. As specified in Section 096623 "Resinous Matrix Terrazzo Flooring."

3. Base: Stainless steel sheet.

4. Wall Panels (3-sides): Flush,wood veneer panels complying with Section 064216 "Flush Wood Paneling."
5. Fabricate car door frame integrally with front wall of car.
6. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
7. Handrails: #4satin stainless steel, design as indicated on the drawings.
8. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
9. Ceiling: Cove LED light fixtures and ceiling panels.

    a. Stainless Steel: Flush, formed metal construction fabricated from stainless steel sheet.

10. Light Fixture Efficiency: Not less than 35 lumens/W.
11. Ventilation Fan Efficiency: Not less than 3.0 cfm/W.

2.8 HOISTWAY COMPONENTS

A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.

B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.

C. Buffers, Car and Counterweight: Brushed Stainless Steel.

D. Hoistway Operating Devices:

1. Emergency stop switch in the pit
2. Terminal stopping switches.
3. Emergency stop switch on the machine

E. Positioning System: System consisting of magnets and proximity switches.

F. Guide Rails and Attachments: Steel rails with brackets and fasteners.

2.9 RAILS, INSERTS AND BRACKETS

A. Provide standard T section guide rails with tongue and groove joints to receive car guide shoes. Use rails weighing not less than 15-pounds per foot.

B. Use not less than 3/4" thick steel machined fishplates to form rail joints. Connect rails to fishplate with four (4) bolts each side.

C. Brackets shall be used to support the rails from the hoistway framing and/or inserts. The rails shall be attached to the brackets by heavy clamps or clips. Bolting or welding rails to brackets shall only be allowed in certain instances.

D. Where no intermediate support for the elevator rails is shown on the drawings and spacing of the rail supports, typically attached to the floor framing, exceeds 14 feet or if deflection criteria cannot be met, provide rail backing engineered and approved by the manufacturer. If use of rail backing is not recommended by the manufacturer, provide additional intermediate steel beam framing, including any changes that installation may entail, at no cost to the City of New York.

E. The section modulus and moment of inertia of the fishplates shall not be less than that of the rail. Connect rails to fishplate with not less than four (4) bolts.

F. For concrete and concrete block hoistway, furnish rail brackets and provide inserts required.

G. Brackets shall be used to support the rails from the hoistway framing and/or inserts. The rails shall be attached to the brackets by heavy clamps or clips. Bolting or welding rails to brackets shall only be allowed in certain instances. Do not attach brackets to the top flange of hoistway framing steel.

H. Provide rail backing where the vertical distance between support framing is greater than 14'-0" and less than 16'-0" no intermediate support framing is shown on the drawing.

I. Rail support beams will be as shown on structural drawings. Provide any additional structural support required for the installation of the elevators.

J. Provide oversized steel members and brackets for the rails where the distances exceed the manufacturer's standard dimensions.

2.10 COUNTERWEIGHT AND COUNTERWEIGHT FRAMES

A. Provide new counterweights.

B. The weight sections of the counterweight shall be mounted in structural or formed mental frames so designed as to retain them securely in place. The frame and weights shall be constructed so as to fit within a minimal space between the car platform and the hoistway wall.

C. Means shall be provided to retain weight sections in place if they become broken.

D. Where tie rods are used, a minimum of two shall be provided which shall pass through all weight sections. Tie rods shall be provided with a lock nut and cotter pin at each end.

E. Counterweight frames shall be guided on each guide rail by upper and lower guiding members attached to the frame. The clearance between the car and the counter weight shall be not less than one inch. The clearance between the counterweight guard and between the counterweight and the hoistway enclosure shall be not less than ¾ inch.

F. Mount and secure weights in the frames to prevent shifting of the weights by an amount that will reduce the running clearances to less than those specified.

2.11 GOVERNORS, TENSION SHEAVE AND FRAME

A. Provide over-speed governor. On over-speed of the car in either direction, the action of the governor shall cause the cutting off of power to the elevator motor and the slowing down and stopping of the car. Still further increase in speed of the car in the downward direction shall trip the governor, thereby causing the application of the safety.

B. Provide governor rope tension sheave of substantial design having sheave shafts of ample diameter and length, provided with bushed bearing and fittings for forced lubrication.

C. The proper tension in the governor rope shall be maintained by the weighted tension sheave located in the pit. The governors shall be equipped with rope grip jaws designed to clamp the governor rope so as to actuate the car safety upon a predetermined over speed downward. The governors shall be set at an over-speed not less than 115% of the specified rated car speed and not more than the maximum governor tripping speed specified in the ANSI Code for the specified rated cars speed.

D. The governor rope tripping device shall be so designed that no appreciable damage to or deformation of the governor rope shall result from the stopping action the device in the operating the car safety. The governor over-speed switches shall conform to the ANSI Code. The governors shall be accurately adjusted and sealed with that tripping speed specified on the tag as specified in the ANSI code.

2.12 ROPES

A. Provide new ropes of traction steel of size, construction and number to ensure proper operation of the elevator and give satisfactory wearing qualities and of steel strand wound about a lubricated vegetable fiber core center.

B. A metal data tag shall be securely attached to one of the wire rope fastenings. This data tag shall bear the following wire rope data:

1. the diameter in inches;
2. the manufacturer's rated breaking strength;
3. the grade material used;
4. the month and year the ropes were installed;
5. whether non-preformed or preformed;
6. construction classification;
7. name of the person or firm who installed ropes;
8. name of manufacturer of the rope.

C. A new tag shall be installed at each rope renewal. Height of the letters and figures shall not be less than 1/16".

2.13 BUFFERS

A. Provide buffer support steel, braces and anchors.

B. Provide sign in pit indicating designed counterweight run-by.

C. Where buffer switches are required, buffer switches shall be replaced and adjusted for proper operation.

D. Attach buffers with a metal plate, marked by the manufacturer in a legible and permanent manner, indicating:

1. the maximum and minimum loads and the maximum striking speeds for which the buffer may be used;
2. the permissible range in viscosity of the buffer oil to be used stated in Saybolt Seconds Universal at 100 degrees F.
3. the viscosity index number of the oil to be used
4. the pour point in degrees Fahrenheit of the oil to be used
5. the stroke of the buffers
6. the composition of the gas, if used.

2.14 WIRING, TRAVELING CABLES AND CONDUIT

A. Install wiring for the proper operation of the equipment.

B. Provide watertight conduit, boxes and fixtures below the Second floor, in pits and in areas subject to moisture.

C. Provide steel supporting means for suspended traveling cables that exceed 100 feet in length to relieve the conductors of strain. Wiring shall conform to the National Electrical Code.

D. Traveling Cables:

1. Traveling cables shall be so suspended anchored and run that the strain of individual cable conductors will be reduced to a minimum connections to terminal blocks will be free from all strain, and the cables will always be free from contact with the hoistway construction, car or other equipment.
2. The outer cable covering must remain intact between junction boxes, and abrupt bending of the cable producing distortion will not be permitted.
3. Hung cables so that the proper size loop is obtained. The outer braid shall be fire resistant and meet the Underwriters standard test. Ten (10%) percent spares shall be mounted in all traveling cables. With a minimum of eight (8) conductors.
4. Run conductors in rigid steel conduit or metal wireways or EMT. Flexible metal conduit may be used for short runs between such equipment as risers and limit switches, interlocks, push button boxes, etc., and between controllers and machine motors, machine brakes and motor generator sets.
5. All wire and cable shall be copper.
6. The conductors to the hoistway door interlocks from the hoistway riser shall be flame-retardant and suitable for a temperature of not less than 200º C. Conductors shall be type SF or equivalent.
7. Each conductor shall be identified with clear, permanent markings.
8. All wires carrying voice communication shall be of the twisted, shielded type.
9. Provide at least four (4) spare pairs of shielded twisted communication wires.
10. Provide at least four (4) additional spare shielded twisted pairs for card access and Captivate type system on all Elevators.
11. Provide four (4) stranded Coaxial wires.

12. Provide for closed circuit television camera in each Elevator.
13. Run two (2) continuous un-spliced shielded cables, RG-6 type, from top of elevator cab to the connection point.
14. Contractor to determine where to terminate Coaxial cable, either in machine room or outside pit area.
15. Traveling cables shall run from machine room (or center of hoistway) to car connection point.
16. Traveling cables shall be suspended from below car and in hoistway as recommended by the cable manufacturer.
17. Traveling cables shall be flexible and suitably suspended to relieve strain on individual conductors.
18. Precautions must be taken during installation to prevent cables from rubbing or chafing against hoistway and car.
19. Loop shall be thirty times the diameter of the cable.
20. Traveling cables shall enter trough or conduit within 6 ft. of hanger.
21. All traveling cables shall have a flame retarding, oil and moisture resistant outer cover.
22. Include coaxial and shielded wires for cab television camera and communications wire for cab telephone.

E. The audible (alarm) signaling device and the telephone shall automatically transfer to a source of standby (emergency) power within ten (10) seconds after the normal power supply fails. The power source shall be capable of providing for the operation of the audible (alarm) signaling device for at least one (1) hours, and the means of two-way conversation for at least four (4) hours.

F. Terminate cab television wiring (for CCTV in car) at the car top in a clearly marked box and at a location determined by the Commissioner, in a clearly marked box for connection to the CCTV camera installed by others.

G. Provide a separate, duplex, 120 Volt AC, 15 Amp., G.F.C.I. protected utility outlet on the car top for the CCTV power supply. This outlet shall be in addition to the outlet in the top-of-car inspection station.

H. Provide at least ten percent (10%) spare conductors in all hoistway wiring conduits.

2.15 HOISTWAY ENTRANCES

A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.

1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.

B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a qualified testing and inspecting agency based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.

1. Fire-Protection Rating: 1-1/2 hours.

C. Materials and Fabrication: Manufacturer's standards, but not less than the following:

1. Stainless Steel Frames: Formed from stainless steel sheet.

2. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches high, on both jambs of hoistway door frames.
3. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
4. Sills: Extruded aluminum, with grooved surface, 1/4 inch thick.
5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

2.16 SIGNAL EQUIPMENT

A. Style: Equipment and buttons as selected by Commissioner from manufacturer's full range.

B. Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Provide vandal-resistant buttons and lighted elements illuminated with LEDs.

C. Car-Control Stations: Provide manufacturer's standard recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.

1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.
2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics indicated and required.

2.17 FINISH MATERIALS

A. Stainless Steel Sheet: ASTM A240/A240M, Type 304.

B. Stainless Steel Bars: ASTM A276, Type 304.

C. Aluminum Extrusions: ASTM B221, Alloy 6063.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Examine hoistways, hoistway openings, and pits as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.

D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

H. Locate hall signal equipment for elevators as follows unless otherwise indicated:

1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
2. Place hall lanterns either above or beside each hoistway entrance.
3. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting elevator use, either temporary or permanent, perform acceptance tests as required and recommended by ASME A17.1/CSA B44.

B. Operating Test: Load elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.

C. Advise Commissioner in advance of dates and times that tests are to be performed on elevators.

3.5 PROTECTION

A. Temporary Use: Comply with the following requirements for elevator used for construction purposes:

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
2. Provide strippable protective film on entrance and car doors and frames.
3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
5. Do not load elevators beyond their rated weight capacity.
6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to operate and adjust elevator(s).

B. Check operation of elevator with City of New York's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 142123.16

SECTION 210513 - COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 ft above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.2 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Rotor: Random-wound, squirrel cage.

E. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 210513

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Sleeves without waterstop.
2. Sleeves with waterstop.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SLEEVES WITHOUT WATERSTOP

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends.

B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, hot-dip galvanized, with plain ends.

2.2 SLEEVES WITH WATERSTOP

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CALPICO, Inc.
2. GPT; an EnPro Industries company.
3. Metraflex Company (The).
4. Or approved equal.

B. Description: Manufactured steel stainless steel, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout or silicone sealant, seal space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

D. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.3 INSTALLATION OF SLEEVES WITH WATERSTOP

A. Install sleeve with waterstop as new walls and slabs are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout or silicone sealant**, s**eal space around outside of sleeves.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
2. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.5 SLEEVE SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above and below Grade:

a. Sleeves with waterstops.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Concrete Slabs-on-Grade:

a. Sleeves with waterstops.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:

   a. Sleeves with waterstops or stack-sleeve fittings**.**

4. Interior Walls and Partitions:

   a. Sleeves without waterstops.

END OF SECTION 210517

SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. BrassCraft Manufacturing Co.; a Masco company.
2. Chicago Specialty.Dearborn Brass.
3. Jones Stephens Corp.
4. Or approved equal.

2.2 ESCUTCHEONS

A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Chrome-Plated Piping: One-piece steel with polished, chrome-plated finish.
b. Insulated Piping: One-piece steel with polished, chrome-plated finish.
c. Insulated Piping: One-piece stainless steel with polished stainless-steel finish.
d. Insulated Piping: One-piece cast brass with finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stainless steel with polished stainless-steel finish.
f. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece cast brass with finish.
g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
h. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece stainless steel with polished stainless-steel finish.
i. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece cast brass with finish.
j. Bare Piping in Unfinished Service Spaces: One-piece steel with polished, chrome-plated finish.
k. Bare Piping in Equipment Rooms: One-piece steel with polished, chrome-plated finish.
l. Bare Piping in Equipment Rooms: One-piece cast brass with finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: One-piece, floor plate.
2. Existing Piping: Split floor plate.

3.3 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 210518

SECTION 210523 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Iron butterfly valves with indicators.
2. Check valves.
3. Bronze OS&Y gate valves.
4. Iron OS&Y gate valves.
5. Trim and drain valves.

1.3 DEFINITIONS

A. NRS: Nonrising stem.

B. OS&Y: Outside screw and yoke.

C. SBR: Styrene-butadiene rubber.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and weld ends.
3. Set valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

D. Protect flanges and specialties from moisture and dirt.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. UL Listed: Valves must be listed in UL's "Online Certifications Directory" under the headings listed below and must bear UL mark:

1. Fire Main Equipment: HAMV - Main Level

a. Indicator Posts, Gate Valve: HCBZ - Level 1
b. Ball Valves, System Control: HLUG - Level 3
c. Butterfly Valves: HLXS - Level 3
d. Check Valves: HMER - Level 3
e. Gate Valves: HMRZ - Level 3

2. Sprinkler System and Water Spray System Devices: VDGT - Main Level

a. Valves, Trim and Drain: VQGU - Level 1

B. FM Global Approved: Valves must be listed in its "Approval Guide," under the headings listed below:

1. Automated Sprinkler Systems:

a. Indicator posts.
b. Valves.

1) Gate valves.

2) Check valves
3) Miscellaneous valves.

C. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B31.9 for building services piping valves.

D. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

E. NFPA Compliance for valves:

1. Comply with NFPA 13, NFPA 14, NFPA 20, and NFPA 24.

F. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher, as required by system pressures.

G. Valve Sizes: Same as upstream piping unless otherwise indicated.

H. Valve Actuator Types:

1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
2. Handwheel: For other than quarter-turn trim and drain valves.
3. Handlever: For quarter-turn trim and drain valves NPS 2 and smaller.

2.3 IRON BUTTERFLY VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. NIBCO INC.
2. Tyco by Johnson Controls Company.
3. Victaulic Company.
4. Or approved equal.

B. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig.
3. Seat Material: EPDM.
4. Stem: Stainless steel.
5. Disc: Ductile iron, and EPDM or SBR coated.
6. Actuator: Worm gear.
7. Supervisory Switch: Internal or external.

2.4 CHECK VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kennedy Valve Company; a division of McWane, Inc.
2. Mueller Co.
3. NIBCO INC.
4. Tyco by Johnson Controls Company.
5. Victaulic Company.
6. Or approved equal.

2.5 BRONZE OS&Y GATE VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. NIBCO INC.
2. United Brass Works, Inc.
3. Zurn Industries, LLC.
4. Or approved equal.

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Bronze or brass.
4. Wedge: One-piece bronze or brass.
5. Wedge Seat: Bronze.
6. Stem: Bronze or brass.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.6 IRON OS&Y GATE VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kennedy Valve Company; a division of McWane, Inc.
2. Mueller Co.
3. NIBCO INC.
4. Victaulic Company.
5. WATTS.
6. Or approved equal.

2.7 TRIM AND DRAIN VALVES

A. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Milwaukee Valve Company.
b. NIBCO INC.
c. WATTS.
d. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freed from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.3 INSTALLATION, GENERAL

A. Comply with requirements in the following Sections for specific valve-installation requirements and applications:

1. Section 211313 "Wet-Pipe Sprinkler Systems" for application of valves in wet-pipe, fire-suppression sprinkler systems.

B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply, except from fire-department connections. Install permanent identification signs, indicating portion of system controlled by each valve.

C. Install double-check valve assembly in each fire-protection water-supply connection.

D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the pipe center.

F. Install valves in position to allow full stem movement.

G. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

END OF SECTION 210523

SECTION 210529 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Signed and sealed by a qualified professional engineer licensed in the state of NY. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers.

C. Engineering Services Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York, responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

C. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for fire-suppression piping and equipment must withstand the effects of gravity loads and stresses within limits and under conditions indicated according toASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from NYC DOB.

C. NFPA Compliance: Comply with NFPA 13

D. UL Compliance: Comply with UL 203.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: Factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
2. Galvanized Metallic Coatings: Pregalvanized or hot-dip galvanized.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with NFPA-approved, UL-listed, or FM-approved carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 MATERIALS

A. Aluminum: ASTM B 221.

B. Carbon Steel: ASTM A 1011/A 1011M.

C. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A 240/A 240M.

E. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

3.3 INSTALLATION OF HANGER AND SUPPORT

A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Install in accordance with approvals and listings.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Install in accordance with approvals and listings.

D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Install lateral bracing with pipe hangers and supports to prevent swaying.

G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.

H. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

J. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

a. MSS SP-58, Type 39 Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields must span an arc of 180 degrees.

a. MSS SP-58, Type 40 Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
b. NPS 4: 12 inches long and 0.06 inch thick.
c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.4 INSTALLATION OF EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.5 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.6 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.7 PAINTING

A. Touchup:

1. Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded, shop-painted areas on miscellaneous metal are specified in Section 099113 "Exterior Painting." Section 099123 "Interior Painting."

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.8 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use thermal hanger-shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Steel Pipe Clamps (MSS Type 4): For suspension of NPS 1/2 to NPS 24 if little or no insulation is required.
3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
4. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Comply with NFPA requirements.

L. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. C-Clamps (MSS Type 23): For structural shapes.
3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

M. Saddles and Shields: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

N. Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Use instead of building attachments where required in concrete construction.

END OF SECTION 210529

SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Valve tags.
4. Warning tags.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Brady Corporation.
    b. Brimar Industries, Inc.
    c. Marking Services, Inc.
    d. Seton Identification Products; a Brady Corporation company.
    e. Or approved equal.
2. Letter and Background Color: As indicated for specific application under Part 3.
3. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 WARNING SIGNS AND LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Marking Services Inc.
4. Seton Identification Products; a Brady Corporation company.
5. Or approved equal.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.

D. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

E. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

F. Fasteners: Stainless steel rivets or self-tapping screws.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Arc-Flash Warning Signs: Provide arc-flash warning signs in locations and with content in accordance with requirements of OSHA and NFPA 70E.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Marking Services Inc.
4. Seton Identification Products; a Brady Corporation company.
5. Or approved equal.

B. Description: Stamped or engraved with 1/4-inch letters for piping-system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.04 inch aluminum, 0.031 inch thick, with predrilled or stamped holes for attachment hardware.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

2.4 WARNING TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Marking Services Inc.
4. Seton Identification Products; a Brady Corporation company.
5. Or approved equal.

B. Description: Preprinted accident-prevention tags, of plasticized card stock.

1. Size: 3 by 5-1/4 inches minimum.
2. Nomenclature: Large-size primary caption, such as "DANGER," "CAUTION," or "DO NOT OPERATE."
3. Letter and Background Color: As indicated for specific application under Part 3.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.3 INSTALLATION GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.4 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of fire-suppression equipment.

B. Sign and Label Colors:

1. White letters on an ANSI Z535.1 safety-red background.

C. Locate equipment labels where accessible and visible.

D. Arc-Flash Warning Signs: Provide arc-flash warning signs on electrical disconnects and other equipment where arc-flash hazard exists, as indicated on Drawings, and in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

3.5 INSTALLATION OF VALVE TAGS

A. Install tags on valves and control devices in fire-suppression piping systems. List tagged valves in a valve-tag schedule in the operating and maintenance manual. Include the identification "FSV" on all fire-suppression system valve tags.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below.

1. Valve-Tag Size and Shape:

    a. Wet-Pipe Sprinkler System: 3, .

2. Valve-Tag Color: White letters on an ANSI Z535.1 safety-red background.

3.6 INSTALLATION OF WARNING TAGS

A. Warning Tag Color: Black letters on an ANSI Z535.1 safety-yellow background.

B. Attach warning tags, with proper message, to equipment and other items where indicated on Drawings .

END OF SECTION 210553

SECTION 210800 - COMMISSIONING OF FIRE SUPPRESSION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the project: (1) the contract drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the contract [City of New York Standard Construction Contract.]

1.2 SUMMARY

A. This section includes commissioning process requirements for Fire Suppression systems, assemblies, and equipment.

B. Related Requirements:

1. Refer to DDC General Conditions for general commissioning process description.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

B. In addition, provide the following:

1. Certificates of readiness
2. Certificates of completion of installation, prestart, and startup activities.
3. O&M manuals
4. Field / factory Test reports

1.4 DESCRIPTION

A. Commissioning: Commissioning is a systematic process of ensuring that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the City of New York with an unbiased, objective view of the system's installation, operation, and performance. This process does not eliminate or reduce the responsibility of the Contractor to provide a complete design or finished product. Commissioning is intended to enhance the quality of each system installation, startup, and transfer to beneficial use by the City of New York.

B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout.
2. Verify and document proper performance of equipment and systems.
3. Verify that Operation & Maintenance documentation is complete and transferred to City of New York.
4. Verify that the City of New York's operating personnel are adequately instructed.

C. Perform a post occupancy review with O&M staff within 10 months after Substantial Completion.

D. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, and performance checkouts.

E. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Commissioner, Contractor, subcontractors, manufacturers, and equipment suppliers.

F. The Cx process shall not reduce the responsibility of the Contractor to comply with the Contract Documents.

1.5 DEFINITIONS

A. Refer to DDC General Conditions for definitions.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Test Equipment Calibration Requirements: Contractor will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

A. Refer to DDC General Conditions for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the contractor for the equipment being tested. For example, the contractor shall ultimately be responsible for all standard testing equipment for the plumbing system in Division 21. A sufficient quantity of two-way radios shall be provided by the contractor.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the city of NY and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Test equipment (and software) shall become the property of the City of New York upon completion of the commissioning process.

D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of ±0.1°F. Pressure sensors shall have an accuracy of ±2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

B. With assistance from the contractor, the CxA will prepare Pre-Functional Checklists for commissioned components, equipment, and systems.

C. Red-lined Drawings:

1. Verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
4. Create the as-built drawings.

D. Operation and Maintenance Data:

1. Provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
2. The CxA will review the O&M literature once for conformance to project requirements.
3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the contractor.

E. Demonstration and Instruction:

1. Provide demonstration and instruction as required by the specifications for fire suppression systems.
2. A complete instruction plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any instruction.
3. An instruction agenda for each instructing session must be submitted to the CxA one (1) week prior the instructing session.
4. The CxA shall be notified at least 72 hours in advance of scheduled fire pump test so that testing may be observed by the CxA. A copy of the test record shall be provided to the CxA and Commissioner.
5. Engage a Factory-authorized service representative to instruct City of New York's service personnel to adjust, operate, and maintain specialty valves.
6. Engage a Factory-authorized service representative to instruct City of New York's service personnel to adjust, operate, and maintain Fire Pump.
7. Instruct City of New York's service personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining units.
8. Review data in O&M Manuals.

3.2 CONTRACTOR'S RESPONSIBILITIES FOR SUBCONTRACTOR PERFORMANCE

A. The Contractor shall have the following instruction responsibilities

B. Fire Suppression System work: The commissioning responsibilities applicable to the Fire Suppression system are as follows (all references apply to commissioned equipment only):

1. Perform commissioning tests at the direction of the CxA.
2. Attend construction phase coordination meetings.
3. Participate in Fire Suppression systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
4. Provide information requested by the CxA for final commissioning documentation.
5. Include requirements for submittal data, operation and maintenance data, and instructing in each purchase order or sub-contract written.
6. Prepare preliminary schedule for Fire Suppression system orientations and inspections, operation and maintenance manual submissions, instructing sessions, flushing and cleaning, pressure testing, equipment start-up, and task completion for the City of New York. Distribute preliminary schedule to commissioning team members.
7. Update schedule as required throughout the construction period.
8. During the startup and initial checkout process, execute the pressure testing of all piping system.
9. Assist the CxA in all Installation and Functional Checks.
10. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
11. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA 45 days after submittal acceptance.

12. Coordinate inspection and testing with the CxA to provide (72) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.
13. Participate in, and schedule vendors and contractors to participate in the instruction sessions.
14. Provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.

    a. Fire Suppression equipment including pumps, piping, and all other equipment furnished under this Division.
    b. Automatic sprinkler system.
    c. Fire stopping in fire rated construction, including caulking, gasketing and sealing of smoke barriers.

15. The equipment supplier shall document the performance of his equipment.
16. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.
17. Equipment Suppliers

    a. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the City of New York, to keep warranties in force.
    b. Assist in equipment testing per agreements with contractors.
    c. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

18. Provide instruction of the City of New York's operating staff using qualified personnel, as specified.
19. Refer to DDC General Conditions for additional contractor responsibilities.

3.3 CxA'S RESPONSIBILITIES

A. Refer DDC General Conditions for CxA's Responsibilities.

3.4 TESTING PREPARATION

A. Certify in writing to the CxA that Fire Suppression systems, subsystems, and equipment have been installed, tested, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that Fire Suppression instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

D. Inspect and verify the position of each device and interlock identified on checklists.

E. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

F. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.5 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of Fire Protection testing shall include entire Fire Suppression installation. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions.

D. The Contractor shall prepare detailed testing plans, procedures, and checklists for Fire Suppression systems, subsystems, and equipment and submit for CxA review.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the Fire Suppression system, document the deficiency and report it to the City of New York. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.6 FIRE SUPPRESSION SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in Division 21. Provide submittals, test data, inspector record, and certifications to the CxA.

B. Fire Suppression Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of sprinkler distribution systems.

C. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems, and subsystems in Division 21. The following equipment and systems shall be evaluated:

1. Pumps
2. Piping

3. Sprinkler system

3.7 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT

A. Refer to DDC General Conditions for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.8 APPROVAL

A. Refer to DDC General Conditions for requirements for approval procedures.

3.9 OPERATION AND MAINTENANCE MANUALS

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements.

B. Refer to DDC General Conditions for the Contractor and CxA roles in the Operation and Maintenance Manual contribution, review, and approval process.

3.10 INSTRUCTION OF FACILITY PERSONNEL

A. Refer DDC General Conditions for requirements pertaining to instruction.

END OF SECTION 210800

SECTION 211119 - FIRE-DEPARTMENT CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Flush-type fire-department connections.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each fire-department connection.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 FLUSH-TYPE FIRE-DEPARTMENT CONNECTION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Elkhart Brass Mfg. Company, Inc.
2. Potter Roemer.
3. Badger-Powhatan
4. Or approved equal.

B. Standard: UL 405.

C. Type: Flush, for wall mounting.

D. Pressure Rating: 175 psig minimum.

E. Body Material: Corrosion-resistant metal.

F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.

G. Caps: Brass, lugged type, with gasket and chain.

H. Escutcheon Plate: Rectangular, brass, wall type.

I. Outlet: With pipe threads.

J. Number of Inlets: Two.

K. Finish: Polished chrome plated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fire-department connections.

B. Examine roughing-in for fire-suppression standpipe system to verify actual locations of piping connections before fire-department connection installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install wall-type fire-department connections.

B. Install automatic (ball-drip) drain valve at each check valve for fire-department connection.

END OF SECTION 211119

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and fittings.
2. Sprinkler piping specialties.
3. Sprinklers.
4. Alarm devices.
5. Control panels.
6. Pressure gauges.

B. Related Requirements:

1. Section 211119 "Fire Department Connections" for exposed-, flush-, and yard-type fire department connections.

1.3 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.

2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For wet-pipe sprinkler systems.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

D. Engineering Services Submittals: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data, signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

E. Coordination Drawings: Sprinkler system plans and sections, or Building Information Model (BIM), drawn to scale, showing the items described in this Section and coordinated with all building trades.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and professional engineer licensed in the state of NY.

B. Design Data: Approved sprinkler piping working plans, prepared according to NFPA 13, including documented approval by NYC DOB/FDNY, and including hydraulic calculations if applicable.

C. Welding certificates.

D. Field Test Reports:

1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
2. Fire-hydrant flow test report.

E. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications:

1. Installer's responsibilities include engineering, fabricating, and installing sprinkler systems and providing professional New York State Licensed engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

a. Preparation of working plans, calculations, and field test reports by a qualified professional engineer licensed in the State of New York.

C. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

1.9 FIELD CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by the City of New York unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Commissioner's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Sprinkler system equipment, specialties, accessories, installation, and testing to comply with NFPA 13.

C. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

D. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design wet-pipe sprinkler systems.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications:

a. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
b. Elevator Machine Room and Hoistway: Ordinary Hazard, Group 1.
c. General Storage Areas: Ordinary Hazard, Group 1.
d. Libraries, except Large Stack Rooms: Light Hazard.
e. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Light-Hazard Occupancy: 0.10 gpm/sq. ft. over 1500 sq. ft. area.
b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm/sq. ft. over 1500 sq. ft. area.

4. Minimum Density for Deluge-Sprinkler Piping Design:

a. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm/sq. ft. over entire area.
b. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm/sq. ft. over entire area.
c. Extra-Hazard, Group 1 Occupancy: 0.30 gpm/sq. ft. over entire area.
d. Extra-Hazard, Group 2 Occupancy: 0.40 gpm/sq. ft. over entire area.
e. Special Occupancy Hazard: As determined NYC DOB/FDNY.

5. Maximum protection area per sprinkler according to UL listing.
6. Maximum Protection Area per Sprinkler:

a. Storage Areas: 130 sq. ft..
b. Mechanical Equipment Rooms: 130 sq. ft..
c. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

E. Obtain documented approval of sprinkler system design from the NYC Department of Buildings.

F. Seismic Performance: Sprinkler piping to withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 STEEL PIPE AND FITTINGS

A. Standard-Weight Steel Pipe: Galvanized- black-steel pipe, ASTM A53/A53M, Type E, . Pipe ends may be factory or field formed to match joining method.

B. Schedule 10, Black-Steel Pipe: ASTM A135/A135M or ASTM A795/A795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.

C. Steel Pipe Nipples: Galvanized black steel, ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.

D. Steel Couplings: Galvanized uncoated steel, ASTM A865/A865M, threaded.

E. Gray-Iron Threaded Fittings: Galvanized uncoated gray-iron threaded fittings, ASME B16.4, Class 125, standard pattern.

F. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic and asbestos free.

a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.

2.3 SPRINKLER PIPING SPECIALTIES

A. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Reliable Automatic Sprinkler Co., Inc. (The).

b. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
c. Victaulic Company.
d. Or approved equal.

2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded or grooved.

B. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
b. Victaulic Company.
c. Viking Group Inc.
d. Or approved equal.

2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

C. Adjustable Drop Nipples:

1. Subject to compliance with requirements, provide products by one of the following:

a. Aegis Technologies, Inc.
b. CECA, LLC.
c. Merit Manufacturing.
d. Or approved equal.

2. Standard: UL 1474.
3. Pressure Rating: 250-psig minimum.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

2.4 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Reliable Automatic Sprinkler Co., Inc. (The).
2. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.

3. Victaulic Company.
4. Viking Group Inc.
5. Or approved equal.

B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767.
2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

2.5 ALARM DEVICES

A. Alarm-device types to match piping and equipment connections.

B. Electrically Operated Notification Appliances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Potter Electric Signal Company, LLC.
b. System Sensor
c. Viking
d. Or approved equal.

C. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Potter Electric Signal Company, LLC.
b. System Sensor.
c. Viking Group Inc.
d. Or approved equal.

2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig.
7. Design Installation: Horizontal or vertical.

D. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Potter Electric Signal Company, LLC.
b. System Sensor.

c. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
d. Viking Group Inc.
e. Or approved equal.

2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

E. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Potter Electric Signal Company, LLC.
b. System Sensor.
c. Viking
d. Or approved equal.

2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 CONTROL PANELS

A. Description: Single-area, two-area, or single-area cross-zoned control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves.

1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" when used with thermal detectors and Class A detector circuit wiring.
2. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Manual Control Stations, Electric Operation: Metal enclosure, labeled "MANUAL CONTROL STATION," with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.7 PRESSURE GAUGES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ashcroft Inc.
2. Reliable Sprinkler Co.
3. Viking Corp.
4. Or approved equal.

B. Standard: UL 393.

C. Dial Size: 3-1/2- to 4-1/2-inch diameter.

D. Pressure Gauge Range: 0- to 250-psig minimum.

E. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.3 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping.

B. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-service piping.

C. Install shutoff valve, check valve, pressure gauge, and drain at connection to water service.

3.4 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping."

B. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-distribution piping.

C. Install shutoff valve, check valve, pressure gauge, and drain at connection to water supply.

3.5 INSTALLATION OF PIPING

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from the NYC Department of Buildings. File written approval with Commissioner before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

K. Install alarm devices in piping systems.

L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

M. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gauges with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they are not subject to freezing.

N. Fill sprinkler system piping with water.

O. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

P. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.6 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join lightwall and Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

M. Extruded-Tee Connections: Form tee in copper tube according to ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.7 INSTALLATION OF VALVES AND SPECIALTIES

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and NYC DOB.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

3.8 INSTALLATION OF SPRINKLERS

A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.9 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.10 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate specialty valves and pressure-maintenance pumps.

3.12 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2 and Smaller, to Be One of the Following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
3. Standard-weight, black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.
4. Standard-weight, galvanized-steel pipe with plain ends; galvanized, plain-end-pipe fittings; and twist-locked joints.
5. Standard-weight, black-steel pipe with cut or roll grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
6. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
7. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
8. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
9. Schedule 10 black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.
10. Schedule 10 black-steel pipe with plain ends; welding fittings; and welded joints.
11. Schedule 5 steel pipe; steel pressure-seal fittings; and pressure-sealed joints.
12. hard copper tube with plain ends; cast or wrought-copper, solder-joint fittings; and brazed joints.
13. hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.
14. NPS 2, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

D. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2-1/2 to NPS 4, to be one of the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
3. Standard-weight, black-steel pipe with cut or roll grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
4. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
5. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
6. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
7. Schedule 10 black-steel pipe with plain ends; welding fittings; and welded joints.
8. hard copper tube with plain ends; cast or wroughtcopper, solder-joint fittings; and brazed joints.

9. hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.
10. hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

E. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 5 and Larger, to Be One of the Following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
3. Standard-weight, black-steel pipe with cut or roll grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
4. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
5. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
6. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
7. Schedule 10 black-steel pipe with plain ends; welding fittings; and welded joints.
8. hard copper tube with plain ends; cast or wrought copper, solder-joint fittings; and brazed joints.
9. hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

3.13 SPRINKLER SCHEDULE

A. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
3. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313

SECTION 213213 - ELECTRIC-DRIVE, VERTICAL-TURBINE FIRE PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Vertical-turbine fire pumps.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rated capacities, operating characteristics, performance curves, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For fire pumps, motor drivers, and fire-pump accessories and specialties.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For fire pumps, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Certificates: For each type of fire pump, from manufacturer.

C. Source quality-control reports.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire pumps to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Comply with NFPA 20.

B. Pump Equipment, Accessory, and Specialty Pressure Rating: 175 psig minimum unless higher pressure rating is indicated.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 VERTICAL-TURBINE FIRE PUMPS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Peerless Pumps model 5PVF7 and Grundfos model CR3-5-3PHor comparable product by one of the following:

1. Patterson Pump Company; a Gorman-Rupp company.
2. Peerless Pump Company.
3. Aurora Pump Co.
4. Or approved equal.

B. Pump Head: Cast iron, for surface discharge.

1. Discharge Outlet: Flanged with flanges complying with ASME B16.1; except connections may be threaded according to ASME B1.20.1, in sizes where flanges are not available.
2. Pump Head Seal: Stuffing box and packing.
3. Base: Cast iron or steel with hole for electrical cable.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of fire pumps.

B. Examine roughing-in for fire-suppression piping systems to verify actual locations of piping connections before fire-pump installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Fire-Pump Installation Standard: Comply with NFPA 20 for installation of fire pumps, relief valves, and related components.

B. Equipment Mounting:

1. Install fire pumps on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

C. Install fire-pump discharge piping equal to or larger than size required by NFPA 20.

D. Support piping and pumps separately, so weight of piping does not rest on pumps.

E. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in Section 211313 "Wet-Pipe Sprinkler Systems."

F. Install pressure gage on pump-head discharge flange pressure-gage tapping. Comply with requirements for pressure gages specified in Section 211313 "Wet-Pipe Sprinkler Systems."

G. Install piping hangers and supports, anchors, valves, gages, and equipment supports according to NFPA 20.

H. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.

I. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

3.4 ALIGNMENT

A. Align pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.

B. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.

C. Align piping connection.

D. Align pump and driver shafts for angular and parallel alignment according to HI 2.4 and to tolerances specified by manufacturer.

3.5 CONNECTIONS

A. Comply with requirements for piping and valves specified in Section 211313 "Wet-Pipe Sprinkler Systems." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to pumps and equipment to allow service and maintenance.

C. Connect fire pumps to their controllers.

3.6 IDENTIFICATION

A. Identify system components. Comply with requirements for fire-pump marking according to NFPA 20.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate fire pumps.

END OF SECTION 213213

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Sleeves without waterstop.
2. Sleeves with waterstop.
3. Stack-sleeve fittings.
4. Sleeve-seal systems.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SLEEVES WITHOUT WATERSTOP

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends.

2.2 SLEEVES WITH WATERSTOP

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CALPICO, Inc.
2. GPT; an EnPro Industries company.
3. Metraflex Company (The).
4. Or approved equal.

B. Description: Manufactured galvanized steel, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.

2.3 STACK-SLEEVE FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Jay R. Smith Mfg Co; a division of Morris Group International.
2. Wade; a subsidiary of McWane Inc.
3. Zurn Industries, LLC.
4. Or approved equal.

B. Description: Manufactured, Dura-coated or Duco-coated galvanized cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.4 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CALPICO, Inc.
2. GPT; an EnPro Industries company.
3. Metraflex Company (The).
4. Or approved equal.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Designed to form a hydrostatic seal of 20 psig minimum.

2. Sealing Elements: interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel Stainless steel Stainless steel, Type 316.
4. Connecting Bolts and Nuts: Carbon steel, with ASTM B633 coating Stainless steel Stainless steel, Type 316 of length required to secure pressure plates to sealing elements.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.3 INSTALLATION OF SLEEVES WITH WATERSTOP

A. Install sleeve with waterstop as new walls and slabs are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using , seal the space around outside of sleeves.

3.4 INSTALLATION OF STACK-SLEEVE FITTINGS

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using waterproof silicone sealant, seal space between top hub of stack-sleeve fitting and pipe.

B. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF SLEEVE-SEAL SYSTEMS

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building, and passing through exterior walls.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
2. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.7 SLEEVE SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above and below Grade:

a. Sleeves with waterstops.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Concrete Slabs-on-Grade:

a. Sleeves with waterstops.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:

a. Sleeves with waterstops or stack-sleeve fittings.

4. Interior Partitions:

a. Sleeves without waterstops.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed and salvaged, or removed and reinstalled.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chicago Specialty.
2. Producers Specialty
3. Sanitary-Dish
4. Or approved equal.

2.2 ESCUTCHEONS

A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
b. Insulated Piping: One-piece steel with polished, chrome-plated finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
e. Bare Piping in Unfinished Service Spaces: One-piece steel with polished, chrome-plated finish.
f. Bare Piping in Equipment Rooms: One-piece steel with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping : One-piece, floor plate.
2. Existing Piping: Split floor plate.

3.3 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 220518

SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Pressure gages.
3. Test plugs.
4. Test-plug kits.
5. Water Meters
6. Related Requirements:

    a. Section 221119 "Domestic Water Piping Specialties" for water meters.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ashcroft Inc.
2. Trerice, H. O. Co.
3. Weksler Glass Thermometer Corp.
4. Or approved equal.

B. Standard: ASME B40.200.

C. Case: sealed type(s); stainless steel with nominal diameter.

D. Dial: with permanently etched scale markings and scales in deg F and deg C.

E. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

F. Accuracy: Plus or minus 1 percent of scale range.

2.2 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ashcroft Inc.
b. Weksler Glass Thermometer Corp.
c. Winters Instruments - U.S.
d. Or approved equal.

2. Standard: ASME B40.100.
3. Case: type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
5. Movement: Mechanical, with link to pressure element and connection to pointer.

B. Remote-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Standard: ASME B40.100.
2. Movement: Mechanical, with link to pressure element and connection to pointer.

2.3 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Peterson Equipment Co., Inc.
2. Weiss Instruments, Inc.
3. Weksler Glass Thermometer Corp.
4. Or approved equal.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4, ASME B1.20.1 pipe thread.

2.4 TEST-PLUG KITS

A. Furnish one test-plug kit(s) containing one thermometer one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes must be of diameter to fit test plugs and of length to project into piping.

B. Pressure Gage: Small, Bourdon-tube insertion type with diameter dial and probe. Dial range shall be at least 0 to 200 psig .

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

H. Install remote-mounted pressure gages on panel.

I. Install valve and snubber in piping for each pressure gage for fluids.

J. Install test plugs in piping tees.

K. Install thermometers in the following locations:

1. Inlet and outlet of each water heater.
2. Inlets and outlets of each domestic water heat exchanger.
3. Inlet and outlet of each domestic hot-water storage tank.
4. Inlet and outlet of each remote domestic water chiller.

L. Install pressure gages in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.

3.3 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.4 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

3.5 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each water service into building must be one of the following:

1. General-purpose pressure gauges must be accurate to +/- 1-1/2% of span, 4-1/2". (114 mm) size, alumnium case with rubber blowout disc in rear, acrylic lenses, chrome-plated steel ring, with P true zero indication. Liquid-filled, -mounted, metal case.
2. General-purpose pressure gauges must be accurate to +/- 1-1/2% of span, 4-1/2". (114 mm) size, alumnium case with rubber blowout disc in rear, acrylic lenses, chrome-plated steel ring, with true zero indication.
3. Each gauge must have 1/4 in. (6 mm) NPT bottom connection, with adjustable block pointer, white face, black figures and segmentals.
4. Gauges must be fitted with pulsation snubbers and brass bar stock needle valves or ball valves rated at 600 psi (400 bar) WOG. Ball cocks with plug-type mechanisms will not be acceptable. with EPDM self-sealing rubber inserts.

3.6 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for all domestic water piping must be between 25% and 7% of the full-scale range, and the maximum operating pressure must not exceed 75% of the full scale range.

END OF SECTION 220519

SECTION 220523.12 - BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Bronze ball valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. RPTFE: Reinforced polytetrafluoroethylene.

C. WOG: Water, oil, gas.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic water valves intended to convey or dispense water for human consumption must comply with the U.S. Safe Drinking Water Act (SDWA), NSF 61 and NSF 372, or must be certified to be in compliance with NSF 61 and NSF 372 (by an ANSI-accredited third-party certification body) that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on steel valves.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for cast copper solder-joint connections.
6. ASME B16.22 for wrought copper and copper alloy solder-joint connections.
7. ASME B16.34 for flanged and threaded end connections
8. ASME B31.9 for building services piping valves.

C. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valve Actuator Type:

1. Hand Lever: For quarter-turn valves.

G. Valves in Insulated Piping:

1. Provide 2-inch extended neck stems.

2. Extended operating handles with nonthermal-conductive covering material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, Two Piece with Full Port, and Bronze or Brass Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Milwaukee Valve Company.
    c. NIBCO INC.
    d. WATTS.
    e. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Bronze.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Bronze or brass.
9. Ball: Chrome-plated brass.
10. Port: Full.

B. Bronze Ball Valves, Two Piece with Full Port, and Bronze or Brass Trim, Press Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Milwaukee Valve Company.
    c. NIBCO INC.
    d. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145; IAPMO/ANSI Z1157.
3. CWP Rating: Minimum 200 psig.
4. Body Design: Two piece.
5. Body Material: Bronze.
6. Ends: Press.
7. Press-End Connections Rating: Minimum 200 psig.
8. Seats: PTFE or RTPFE.
9. Stem: Bronze or brass.
10. Ball: Chrome-plated brass.
11. Port: Full.
12. O-Ring Seal: EPDM or Buna-N.

C. Bronze Ball Valves, Two Piece with Full Port and Stainless Steel Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Milwaukee Valve Company.
    c. NIBCO INC.
    d. WATTS.
    e. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Bronze.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Stainless steel.
9. Ball: Stainless steel, vented.
10. Port: Full.

D. Bronze Ball Valves, Two Piece with Regular Port and Bronze or Brass Trim, Threaded Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Milwaukee Valve Company.
    c. NIBCO INC.
    d. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Bronze.
6. Ends: Threaded.
7. Seats: PTFE.
8. Stem: Bronze or brass.
9. Ball: Chrome-plated brass.
10. Port: Regular.

E. Bronze Ball Valves, Two Piece with Regular Port and Stainless Steel Trim, Threaded Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Milwaukee Valve Company.
    c. NIBCO INC.
    d. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.

5. Body Material: Bronze.
6. Ends: Threaded.
7. Seats: PTFE.
8. Stem: Stainless steel.
9. Ball: Stainless steel, vented.
10. Port: Regular.

F. Bronze Ball Valves, Three Piece with Full Port and Bronze or Brass Trim, Threaded Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. WATTS.
   c. NIBCO INC.
   d. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Three piece.
5. Body Material: Bronze.
6. Ends: Threaded.
7. Seats: PTFE.
8. Stem: Bronze or brass.
9. Ball: Chrome-plated brass.
10. Port: Full.

G. Bronze Ball Valves, Three Piece with Full Port and Stainless Steel Trim, Threaded Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. DynaQuip Controls.
   c. NIBCO INC.
   d. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Three piece.
5. Body Material: Bronze.
6. Ends: Threaded.
7. Seats: PTFE.
8. Stem: Stainless steel.
9. Ball: Stainless steel, vented.
10. Port: Full.

H. Bronze Ball Valves, Three Piece with Regular Port and Bronze or Brass Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.

b. NIBCO INC.
c. Watts.
d. Or approved equal.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Three piece.
5. Body Material: Bronze.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Bronze.
9. Ball: Chrome-plated brass.
10. Port: Regular.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, free from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow space for service, maintenance, and equipment removal without system shutdown.

B. Provide support to piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access.

D. For valves in horizontal piping, install valves with stem at or above center of pipe.

E. Install valves in position to allow full valve actuation movement.

F. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's recommended maximum.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves exhibiting leakage.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, provide the same types of valves with higher CWP ratings.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.
7. For Stainless Steel Piping, NPS 2 and Smaller: Threaded ends.
8. For Stainless Steel Piping,NPS 2-1/2to NPS 4: Flanged ends.
9. For Stainless Steel Piping,NPS 2 and Smaller: Press ends.

3.6 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Brass ball valve, one piece. Provide with threaded -joint ends.
2. Bronze ball valves, two piece with full port, and bronze trim. Provide with threaded or soldered -joint ends.
3. Bronze ball valves, three piece with full port, and bronze or brass trim.
4. Bronze ball valves, two piece with regular port, and bronze trim.

B. Pipe NPS 2-1/2 and Larger:

1. Steel ball valves, Class 150 with full port.

END OF SECTION 220523.12

SECTION 220523.13 - BUTTERFLY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Iron, flangeless (wafer-type) butterfly valves.
2. Ductile-iron, grooved-end butterfly valves.
3. Stainless steel, grooved-end butterfly valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer rubber.

C. NBR: ABS, Buna-N, or nitrile butadiene rubber.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.

3. Set butterfly valves closed or slightly open.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic water piping specialties intended to convey or dispense water for human consumption must comply with the U.S. Safe Drinking Water Act (SDWA), NSF 61 and NSF 372, or must be certified to be in compliance with NSF 61 and NSF 372 (by an ANSI-accredited third-party certification body) that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B16.5 for flanges on steel valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B31.9 for building services valves.

C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valve Actuator Types:

1. Gear Actuator: For valves NPS 8 and larger.
2. Hand lever: For valves NPS 6 and smaller.
3. Chainwheel: Device for attachment to gear, handlever, or stem; of size and with chain for mounting height, according to "Installation of Valves" Article.

G. Valves in Insulated Piping: Provide 2-inch extended neck stems.

2.3 DUCTILE-IRON, GROOVED-END BUTTERFLY VALVES

A. Ductile Iron, Grooved-End Butterfly Valves, 300 CWP:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kennedy Valve Company; a division of McWane, Inc.
b. NIBCO INC.
c. WATTS.
d. Or approved equal.

2. Standard: MSS SP-67, Type I.
3. Body Material: Coated, ductile iron.
4. Stem: Two-piece stainless steel.
5. Disc: Coated, ductile iron.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, free from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine mating flange faces for damage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

D. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow space for service, maintenance, and equipment removal without system shutdown.

B. Provide support to piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full valve actuation movement.

F. Install chainwheels on actuators for butterfly valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. If leakage cannot be repaired, replace valves.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 and Larger:

1. Ductile-Iron, Grooved-End Butterfly Valves: 175 CWP.

B. Stainless Steel Pipe NPS 2-1/2 and Larger: Stainless steel, grooved-end butterfly valve.

END OF SECTION 220523.13

SECTION 220523.14 - CHECK VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Bronze, swing check valves.
2. Iron, swing check valves with closure control.
3. Iron, center-guided check valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer.

C. NBR: Nitrile butadiene rubber (also known as Buna-N).

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, press connections, and weld ends.
3. Set check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use stems or other components as lifting or rigging points unless specifically indicated for this purpose in manufacturer's instructions.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic water piping check valves intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), and NSF 61/NSF 372, or to be certified in compliance with NSF 61/NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges for metric standard piping.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for cast-copper solder joint.
6. ASME B16.22 for wrought copper solder joint.
7. ASME B16.51 for press joint.
8. ASME B31.9 for building services piping valves.

C. AWWA Compliance: Comply with AWWA C606 for groove-end connections.

D. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are unacceptable.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.3 BRONZE SWING CHECK VALVES

A. Bronze, Swing Check Valves with Bronze Disc, Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Milwaukee Valve Company.
   c. NIBCO INC.
   d. Or approved equal.

2. Description:

   a. Standard: MSS SP-80, Type 3.
   b. CWP Rating: 300 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B62, bronze.
   e. Ends: Threaded or soldered. See valve schedule articles.
   f. Disc: Bronze.

2.4 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A. Iron, Swing Check Valves with Lever- and Spring-Closure Control, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. APCO DeZurik Valve Co.
   b. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   c. Flomatic Corporation.
   d. Or approved equal.

2. Description:

   a. Standard: MSS SP-71, Type I.
   b. CWP Rating: 200 psig.
   c. Body Design: Clear or full waterway.
   d. Body Material: ASTM A126, gray iron with bolted bonnet.
   e. Ends: Flange or threaded. See valve schedule articles.
   f. Trim: Bronze.
   g. Gasket: Asbestos free.
   h. Closure Control: Factory-installed exterior lever and weight.

2.5 IRON, CENTER-GUIDED, SPRING-LOADED CHECK VALVES

A. Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat, Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International.
b. APCO DeZurik Valve Co.
c. Apollo Valves; a part of Aalberts Integrated Piping Systems.
d. Victaulic Company.
e. Or approved equal.

2. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 300 psig.
c. Body Material: ASTM A395/A395M or ASTM A536, ductile iron.
d. Style: Compact wafer, spring loaded.
e. Seat: Bronze.

B. Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat, Class 300:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International.
b. Flomatic Valves.
c. Victaulic Company.
d. Or approved equal.

2. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 500 psig.
c. Body Material: ASTM A395/A395M or ASTM A536, ductile iron.
d. Style: Compact wafer, spring loaded.
e. Seat: Bronze.

C. Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat, Class 250:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. APCO DeZurik Valve Co.
b. Flomatic Valves.
c. Victaulic Company.
d. Or approved equal.

2. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 400 psig.
c. Body Material: ASTM A126, gray iron.
d. Style: Compact wafer, spring loaded.

D. Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat, Class 300:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. APCO DeZurik Valve Co.
b. Flomatic Valves.
c. Victaulic Company.
d. Or approved equal.

2. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 500 psig.
c. Body Material: ASTM A395/A395M or ASTM A536, ductile iron.
d. Style: Compact wafer, spring loaded.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Examine press fittings to verify they have been properly press.

F. Do not attempt to repair defective valves; replace with new valves.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access and where not blocked by equipment, other piping, or building components.

D. Install valves so that stems are horizontal or slope upward from centerline of pipe.

E. Install valves in position that does not project into aisles or block access to other equipment.

F. Install valves in position to allow full stem and manual operator movement.

G. Verify that joints of each valve have been properly installed and sealed to assure there is no leakage or damage.

H. Check Valves: Install check valves for proper direction of flow.

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Center-Guided Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

I. Adhere to manufacturer's installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's recommended maximum.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Pump-Discharge Check Valves:

a. NPS 2 and Smaller: Bronze, swing check valves with bronze disc.
b. NPS 2-1/2 and Larger for Domestic Water: Iron, swing check valves with lever and weight or spring; or iron, center-guided, metal-seat check valves.
c. NPS 2-1/2 and Larger for Sanitary Waste and Storm Drainage: Iron, swing check valves with lever and weight or spring.

B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

C. End Connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded, soldered, or press-end connections.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flange or threaded.
3. For Copper Tubing, NPS 5 and Larger: Flange.
4. For Steel Piping, NPS 2 and Smaller: Threaded.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flange or threaded.
6. For Steel Piping, NPS 5 and Larger: Flange.
7. For Groove-End Copper Tubing and Steel Piping: Groove.

3.6 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze, swing check valves with bronze disc, Class 125, with soldered end connections.

B. Pipe NPS 2-1/2 and Larger:

1. Iron, swing check valves with metal seats, Class 250, with flange end connections.
2. Iron, swing check valves with closure control lever and spring, Class 125, with flange end connections.

END OF SECTION 220523.14

SECTION 220523.15 - GATE VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Iron gate valves.
2. Chainwheels.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer.

C. NRS: Nonrising stem.

D. OS&Y: Outside screw and yoke.

E. RS: Rising stem.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, press connections, and weld ends.
3. Set gate valves closed to prevent rattling.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels, stems, or other components as lifting or rigging points unless specifically indicated for this purpose in manufacturer's instructions.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic water piping check valves intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), and NSF 61/NSF 372, or to be certified in compliance with NSF 61/NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on metric standard piping.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for cast-copper solder joint.
6. ASME B16.22 for wrought copper solder joint.
7. ASME B16.51 for press joint.
8. ASME B31.9 for building services piping valves.

C. AWWA Compliance: AWWA C606 for groove-end connections.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valves in Insulated Piping: With 2-inch stem extensions.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.3 IRON GATE VALVES

A. Iron Gate Valves, OS&Y, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
b. Milwaukee Valve Company.
c. Tyco by Johnson Controls Company.
d. WATTS.
e. Zurn Industries, LLC.
f. Or approved equal.

2. Description:

a. Standard: MSS SP-70, Type I.
b. CWP Rating: 200 psig.
c. Body Material: Gray iron with bolted bonnet.
d. Ends: Flange.
e. Trim: Bronze.
f. Disc: Solid wedge.
g. Packing and Gasket: Asbestos free.

B. Iron Gate Valves, OS&Y, Class 250:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
b. Milwaukee Valve Company.
c. Victaulic Company.
d. WATTS.
e. Zurn Industries, LLC.
f. Or approved equal.

2. Description:

a. Standard: MSS SP-70, Type I.
b. CWP Rating: 500 psig.
c. Body Material: Gray iron with bolted bonnet.
d. Ends: Flange.
e. Trim: Bronze.
f. Disc: Solid wedge.

g. Packing and Gasket: Asbestos free.

2.4 CHAINWHEELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Babbitt Steam Specialty Co.
2. Roto Hammer Industries; Rotork.
3. Trumbull Industries.
4. Or approved equal.

B. Description: Valve actuation assembly with sprocket rim, chain guides, chain, and attachment brackets for mounting chainwheels directly to hand wheels.

1. Sprocket Rim with Chain Guides: Ductile or cast iron, of type and size required for valve. Include zinc or epoxy coating.
2. Chain: Hot-dip galvanized steel, of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freed from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Examine press joint surfaces. Verify they are clean and free from dents and burrs, and that o-ring seals are in place and undamaged.

F. Do not attempt to repair defective valves; replace with new valves.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access and where not blocked by equipment, other piping, or building components.

D. Install valves so that stems are horizontal or slope upward from centerline of pipe.

E. Install valves in position that does not project into aisles or block access to other equipment.

F. Install valves in position to allow full stem and manual operator movement.

G. Verify that joints of each valve have been properly installed and sealed to assure there is no leakage or damage.

H. Install chainwheels on manual operators for gate valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

I. Adhere to manufacturer's installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's recommended maximum.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. Use gate valves for shutoff service only.

B. End Connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded, soldered, or press-end connections.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flange or threaded.
3. For Copper Tubing, NPS 5 and Larger: Flange.
4. For Steel Piping, NPS 2 and Smaller: Threaded.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flange or threaded.
6. For Steel Piping, NPS 5 and Larger: Flange.
7. For Groove-End Copper Tubing and Steel Piping: Groove.

3.6 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze gate valves, NRS, Class 125 with soldered ends.

B. Pipe NPS 2-1/2 and Larger: Iron gate valves, OS&Y, Class 250 with flange ends.

END OF SECTION 220523.15

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Pipe-positioning systems.
4. Equipment supports.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Environmental Product Declaration (EPD): For each product.

C. Shop Drawings: Signed and sealed by a qualified professional engineer licensed in the State of New York. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.

5. Equipment supports.

D. Engineering Services Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the state of NY responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

C. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for plumbing piping and equipment must withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Engineer supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Engineer equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Engineer seismic-restraint hangers and supports for piping and equipment and obtain approval from NYC DOB.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.

3. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 PIPE-POSITIONING SYSTEMS

A. Description: IAPMO PS 42 positioning system composed of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-carbon-steel shapes.

2.6 MATERIALS

A. Carbon Steel: ASTM A 1011/A 1011M.

B. Structural Steel: ASTM A 36/A 36M carbon-steel plates, shapes, and bars; black and galvanized.

C. Stainless Steel: ASTM A 240/A 240M.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

3.3 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-58. Install hangers and attachments as required to properly support piping from building structure.

D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

E. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

F. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

G. Pipe Stand Installation:

1. Pipe Stand Types, except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

H. Pipe-Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

I. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

J. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

K. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

L. Install lateral bracing with pipe hangers and supports to prevent swaying.

M. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.

N. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

P. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields must span an arc of 180 degrees.

    a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.

d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.4 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Provide lateral bracing, to prevent swaying, for equipment supports.

3.5 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.6 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.7 PAINTING

A. Touchup: Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

END OF SECTION 220529

SECTION 220533 - HEAT TRACING FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes heat tracing of plumbing piping for freeze prevention and, domestic hot-water-temperature maintenance with self-regulating, parallel resistance electric heating cables:

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, and furnished specialties and accessories.
2. Schedule heating capacity, length of cable, spacing, and electrical power requirement for each electric heating cable required.

B. Shop Drawings: For electric heating cable.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric heating cables and controls to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace electric heating cable that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chromalox, Inc.
2. Nelson Heat Trace; a division of Emerson.
3. RAYCHEM; brand of nVent Electrical plc.
4. Thermon Americas Inc.
5. Or approved equal.

B. Source Limitations: Obtain all heat tracing from one manufacturer.

C. Heating Element: Pair of parallel AWG, nickel-coated, stranded copper bus wires embedded in crosslinked conductive polymer core, which varies heat output in response to temperature along its length.

D. Electrical Insulating Jacket: Flame-retardant polyolefin.

E. Cable Cover: Polyolefin outer jacket with ultraviolet inhibitor.

2.2 CONTROLS

A. Control Panel:

1. Automatic control with manual on, automatic, and standby/reset switch.
2. Remote temperature sensor senses domestic hot water temperature: programmable to control the domestic hot water temperature at 110 to 120 deg F.
3. Corrosion-proof and waterproof enclosure suitable for outdoor mounting, for controls and temperature sensors.
4. Minimum 30 A contactor to energize cable or close other contactors.
5. Ground-fault protection.
6. Single-point control of heat tracing for freeze protection and domestic hot-water-temperature maintenance.
7. Provide communication ports with contacts, RS485, or Ethernet interface for remote monitoring and alarm by central HVAC-control system. Coordinate type of connection ports with Section 230923 "Direct Digital Control (DDC) System for HVAC."

B. Programmable Timer for Domestic Hot-Water-Temperature Maintenance:

1. Microprocessor based.
2. Minimum of four separate schedules.
3. Minimum 24-hour battery carryover.
4. On-off-auto switch.
5. 365-day calendar with 20 programmable holidays.
6. Relays with contacts to indicate operational status, on or off, and for interface with central HVAC-control system.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine surfaces and substrates to receive electric heating cables for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install electric heating cable at locations indicated and in accordance with NFPA 70.

B. Install electric heating cable across expansion, construction, and control joints in accordance with manufacturer's written instructions; use cable-protection conduit and slack cable to allow movement without damage to cable.

C. Install electric heating cables after piping has been tested and before insulation is installed.

D. Install electric heating cables in accordance with IEEE 515.1.

E. Install insulation over piping with electric cables in accordance with Section 220719 "Plumbing Piping Insulation."

F. Install warning tape on piping insulation where piping is equipped with electric heating cables.

G. Set field-adjustable switches and circuit-breaker trip ranges.

H. Install temperature-control units in an accessible location and in accordance with manufacturer's written instructions. Locate sensing bulbs to sense outside air temperature in a location where it will not be affected by direct sunlight or other heat sources.

I. Install control panels and distribution panels where indicated and in accordance with manufacturer's written instructions.

J. Install and connect outside air and pipe temperature sensors.

3.4 ELECTRICAL CONNECTIONS

A. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Connect temperature-control unit for freeze protection to interrupt power supply to electric heating cable when outside air is above set point.

D. Connect temperature-control unit for domestic hot-water-temperature maintenance to interrupt power supply to electric heating cable when hot water is above set point.

E. Connect remote electronic temperature sensors.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

D. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.

E. Cables will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports

3.6 .PROTECTION

A. Protect installed heating cables, including nonheating leads, from damage.

B. Remove and replace damaged heat-tracing cables.

END OF SECTION 220533

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Brady Corporation.
    b. Brimar Industries, Inc.
    c. Marking Services, Inc.
    d. Seton Identification Products; a Brady Corporation company.
    e. Or approved equal.

2. Letter and Background Color: As indicated for specific application under Part 3.
3. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.

4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 WARNING SIGNS AND LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Marking Services Inc.
4. Seton Identification Products; a Brady Corporation company.
5. Or approved equal.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.

D. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

E. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

F. Fasteners: Stainless steel rivets or self-tapping screws.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Arc-Flash Warning Signs: Provide arc-flash warning signs in locations and with content in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Marking Services Inc.
4. Seton Identification Products; a Brady Corporation company.

5. Or approved equal.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color coded, with lettering indicating service and showing flow direction in accordance with ASME A13.1.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

2.4 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Marking Services Inc.
4. Seton Identification Products; a Brady Corporation company.
5. Or approved equal.

B. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.04-inch minimum thickness, with predrilled or stamped holes for attachment hardware.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

2.5 WARNING TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Marking Services Inc.
4. Seton Identification Products; a Brady Corporation company.
5. Or approved equal.

B. Description: Preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.

2. Nomenclature: Large-size primary caption, such as "DANGER," "CAUTION," or "DO NOT OPERATE."
3. Letter and Background Color: As indicated for specific application under Part 3.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.3 INSTALLATION, GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.4 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of plumbing equipment.

B. Sign and Label Colors.

1. White letters on an ANSI Z535.1 safety-green background.

C. Locate equipment labels where accessible and visible.

D. Arc-Flash Warning Signs: Provide arc-flash warning signs on electrical disconnects and other equipment where are-flash hazard exists, as indicated on Drawings, and in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

3.5 INSTALLATION OF PIPE LABELS

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Install pipe labels showing service and flow direction with permanent adhesive on pipes.

C. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. of each valve and control device.
2. At access doors, manholes, and similar access points that permit view of concealed piping.
3. Within 3 ft. of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 25 ft. along each run. Reduce intervals to 10 ft. in areas of congested piping and equipment.

D. Do not apply plastic pipe labels or plastic tapes directly to bare pipes conveying fluids at temperatures of 125 deg F or higher. Where these pipes are to remain uninsulated, use a short section of insulation or use stenciled labels.

E. Flow-Direction Flow Arrows: Use arrows, in compliance with ASME A13.1, to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

F. Pipe-Label Color Schedule:

1. Low-Pressure Compressed-Air Piping: White letters on an ANSI Z535.1 safety-blue background.
2. Domestic Cold-Water Piping: White letters on an ANSI Z535.1 safety-green background.
3. Domestic Hot-Water Piping: White letters on an ANSI Z535.1 safety-green background
4. Domestic Hot-Water Return Piping White letters on an ANSI Z535.1 safety-green background.
5. Sanitary Waste and Storm Drainage Piping: White letters on a black background.

3.6 INSTALLATION OF VALVE TAGS

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule in the operating and maintenance manual.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:

1. Valve-Tag Size and Shape:

a. Domestic Cold Water: 2 inches, round.
b. Domestic Hot Water: 2 inches, round.
c. Domestic Hot-Water Return: 2 inches, round.

2. Valve-Tag Colors:

a. For each piping system, use the same lettering and background coloring system on valve tags as used in the piping system labels and background.

3.7 INSTALLATION OF WARNING TAGS

A. Warning Tag Color: Black letters on an ANSI Z535.1 safety-yellow background.

B. Attach warning tags, with proper message, to equipment and other items where scheduled.

END OF SECTION 220553

SECTION 220593 - TESTING, ADJUSTING, AND BALANCING FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. TAB of plumbing equipment:

    a. Domestic water booster pumps.
    b. Sanitary sewage pumps.

2. Pipe-leakage test verification.
3. Testing, adjusting, and balancing of existing plumbing systems and equipment.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

F. TDH: Total dynamic head.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 INFORMATIONAL SUBMITTALS

A. Contract Documents Examination Report: Submit the Initial Construction-Phase Report as specified in "Progress Reporting" Article in Part 3, within 30 days from start of the work.

B. Strategies and Procedures Plan: Submit TAB strategies and step-by-step procedures, as specified in "Preparation" Article in Part 3, within 30 days from start of the work.

C. System Readiness Checklists: Submit system readiness checklists, as specified in "Preparation" Article in Part 3, within 30 days from start of the work.

D. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

E. Certified TAB reports.

F. Sample report forms.

G. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Code Compliance: TAB is required to comply with NYC Construction Codes, NYC Plumbing Code (Including but not limited to ASTME A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process and ISO 9000:2001: Quality Management.

1.7 FIELD CONDITIONS

A. Full City of New York Occupancy: City of New York will occupy the site and existing building during entire TAB period. Cooperate with Commissioner during TAB operations to minimize conflicts with City of New York's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, and balancing valves and fittings. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine approved submittals for plumbing systems and equipment.

D. Examine design data, including plumbing system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about plumbing system and equipment controls.

E. Examine equipment performance data, including pump curves.

1. Relate performance data to Project conditions and requirements, including pump system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate pump system-effect factors to reduce performance ratings of plumbing equipment when installed under conditions different from the conditions used to rate equipment performance. Compare results with the design data and installed conditions.

F. Examine system and equipment installations, and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine plumbing equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

I. Examine temporary and permanent strainers. Verify that temporary strainer screens used during system cleaning and flushing have been removed and permanent strainers are installed and clean.

J. Examine control valves for proper installation for their intended function of isolating, throttling, diverting, or mixing fluid flows.

K. Examine system pumps to ensure absence of entrained air in the suction piping.

L. Examine operating safety interlocks and controls on plumbing equipment.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of plumbing systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Sanitary Sewage/Drainage System:

a. Leakage and pressure tests on sanitary sewage/drainage systems have been completed in accordance with NYC DOB and NYC DEP.
b. Piping is complete.
c. Sanitary sewage pumps/drainage pumps are operational.
d. Control valves are functioning in accordance with the sequence of operation.
e. Shutoff valves are 100 percent open.
f. Suitable access to equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system in accordance with the procedures contained in AABC's "National Standards for Total System Balance" and in this Section.

B. Cut insulation, pipes, and equipment casings for installation of test probes to the minimum extent necessary for TAB procedures.

1. Where holes for probes are required in piping or equipment, install pressure and temperature test plugs to seal systems.
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 220719 "Plumbing Piping Insulation."

C. Mark equipment and balancing devices, including valve position indicators and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR PLUMBING EQUIPMENT

A. Test, adjust, and balance plumbing equipment indicated on Drawings, including, but not limited to, the following:

1. Motors.
2. Domestic water heaters.
3. Drainage pumps.

3.6 PROCEDURES FOR DOMESTIC WATER SYSTEM BOOSTER PUMPS

A. Adjust pumps to deliver total design flow.

1. Measure total water flow.

   a. Position valves for full flow through coils.
   b. Measure flow by main flow meter, if installed.
   c. If main flow meter is not installed, determine flow by pump TDH or known equipment pressure drop.

2. Measure pump TDH as follows:

   a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
   b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
   c. Convert pressure to head and correct for differences in gauge heights.
   d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.
   e. With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved. If excessive throttling is required to achieve desired flow, recommend pump impellers be trimmed to reduce excess throttling.

3. Monitor motor performance during procedures, and do not operate motor in an overloaded condition.

B. Adjust flow-measuring devices installed in mains and branches to design water flows.

1. Measure flow in main and branch pipes.
2. Adjust main and branch balance valves for design flow.
3. Re-measure each main and branch after all have been adjusted.

C. Verify final system conditions as follows:

1. Re-measure and confirm that total water flow is within design.
2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
3. Mark final settings.

D. Verify that memory stops have been set.

3.7 PROCEDURES FOR DOMESTIC HOT-WATER CIRCULATING INLINE PUMP

A. Balance system with manual or automatic balancing valves by setting at design flow.

1. Measure flow in main and branch pipes.
2. Adjust main and branch balance valves for design flow.
3. Re-measure each main and branch after all have been adjusted.

B. Adjust pump to deliver total design flow.

1. Measure pump TDH as follows:

   a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
   b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
   c. Convert pressure to head and correct for differences in gauge heights.
   d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.

2. Monitor motor performance during procedures, and do not operate motor in an overloaded condition.
3. Mark final settings and verify that all memory stops have been set.
4. Verify final system conditions as follows:

   a. Re-measure and confirm that total flow is within design.
   b. Re-measure final pumps' operating data, TDH, volts, amps, speed, and static profile.
   c. Mark final settings.

3.8 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.9 PROCEDURES FOR WATER HEATERS

A. Electric Water Heaters:

1. Measure and record entering- and leaving-water temperatures.
2. Measure and record water flow.
3. Measure and record pressure drop.
4. Measure and Record relief valve(s) pressure setting.
5. Capacity: Calculate in Btu/h of heating output.
6. Efficiency: Calculate operating efficiency for comparison to submitted equipment.

3.10 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record flows, temperatures, and pressures of each piece of equipment. Compare the values to design or nameplate information, where information is available.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the condition of filters.
4. Check bearings and other lubricated parts for proper lubrication.
5. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. TAB After Construction: Before performing testing and balancing of renovated existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished in accordance with renovation scope indicated by Contract Documents. Verify the following:

1. New filters are installed.
2. Bearings and other parts are properly lubricated.
3. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated system flows of the renovated work to the measured flows, and determine the new pump speed.
2. Verify that the indicated system flows of the renovated work result in velocities and pump speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the system flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.

3.11 TOLERANCES

A. Set plumbing system's flow rates within the following tolerances:

1. Domestic Water Flow Rate: . If design value is less than 10 gpm, within 10 percent.

3.12 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for system-balancing devices. Recommend changes and additions to system-balancing devices, to facilitate proper performance measuring and balancing. Recommend changes and additions to plumbing systems and general construction to allow access for performance-measuring and -balancing devices.

B. Status Reports: Prepare progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.13 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing Subcontractor
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents, including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for pump performance forms, including the following:

    a. Variable-frequency controller settings for variable-flow hydronic systems.
    b. Settings for pressure controller(s).

c. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of distribution systems. Present each system with single-line diagram and include the following:

1. Flow rates.
2. Pipe and valve sizes and locations.
3. Balancing stations.
4. Position of balancing devices.

E. Electric Water Heater Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Model number and unit size.
d. Manufacturer's serial number.
e. Output capacity in Btu/h.
f. Number of stages.
g. Connected volts, phase, and hertz.
h. Rated amperage.

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. High-temperature-limit setting in deg F.
e. Operating set point in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

F. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves, and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water-pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump speed.
j. Impeller diameter in inches.
k. Motor make and frame size.

l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

G. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.14 VERIFICATION OF TAB REPORT

A. The TAB specialist must conduct the inspection in the presence of Commissioner.

B. Commissioner must randomly select measurements, documented in the final report, to be rechecked. Rechecking must be limited to the lesser of either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal business day**.**

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements must be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the TAB must be considered incomplete and must be rejected.

E. If recheck measurements find the number of failed measurements noncompliant with requirements indicated, proceed as follows:

1. TAB specialists must recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection. All changes must be tracked to show changes made to previous report.

F. Prepare test and inspection reports.

3.15 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

END OF SECTION 220593

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Roof drains and rainwater leaders.
4. Supplies and drains for ADA accessible lavatories and sinks.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to NYC DOB indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1-2009.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include name of the manufacturer, fabricator, type, description, and size, as well as ASTM standard designation and maximum use temperature.

1.8 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to NYC DOB. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials are applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Glass-Fiber, Preformed Pipe: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 850 deg F in accordance with ASTM C411 Comply with ASTM C547.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Knauf Insulation.
    c. Owens Corning.
    d. Or approved equal.
2. Fabricated shapes in accordance with ASTM C450 and ASTM C585.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.3 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Mon-Eco Industries, Inc.
    d. Or approved equal.

2. Adhesive: As recommended by mineral fiber manufacturer and with a VOC content of 80 g/L or less.

3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range of between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom (12 o'clock and 6 o'clock positions) of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents, unless otherwise approved by the Commissioner.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.5 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles below.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulationormitered or routed fittings made from same material and density as that of adjacent pipe insulation. Each piece is butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulationorsectional pipe insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulationorsectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulationorsectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions, using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation conforms to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 INSTALLATION OF GLASS-FIBER AND MINERAL WOOL INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with glass-fiber or mineral-wool blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated sections are not available, install fabricated sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Commissioner. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless steel jackets.

3.9 FIELD QUALITY CONTROL

A. Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections: Inspect pipe, fittings, strainers, and valves, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection is limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Stormwater and Overflow:

1. All Pipe Sizes: Insulation is one of the following:

a. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

END OF SECTION 220719

SECTION 220800 - COMMISSIONING OF PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the project: (1) the contract drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the contract [City of New York Standard Construction Contract.]

1.2 SUMMARY

A. This section includes commissioning process requirements for Plumbing systems, assemblies, and equipment.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 Submittal Procedures. In addition, provide the following:

B. Certificates of readiness

C. Certificates of completion of installation, prestart, and startup activities.

D. O&M manuals

E. Test reports

1.4 DESCRIPTION

A. Commissioning: Commissioning is a systematic process of verifying that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the City of New York with an unbiased, objective view of the system's installation, operation and performance. This process does not eliminate or reduce the responsibility of the Contractor to provide a complete design or finished product. Commissioning is intended to enhance the quality of each system installation, startup and transfer to beneficial use by the City of New York.

B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing subcontractors.
2. Verify and document proper performance of equipment and systems.

3. Verify that Operation & Service documentation is complete and transferred to City of New York.
4. Verify that the City of New York's operating personnel are adequately oriented.
5. Perform a post occupancy review with O&M staff within 10 months after Substantial Completion.

C. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, balancing and verification and performance checkouts.

D. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Commissioner, Contractor, subcontractors, manufacturers and equipment suppliers.

E. The Cx process shall not reduce the responsibility of the Contractor to comply with the Contract Documents.

1.5 DEFINITIONS

A. Refer to DDC General Conditions for definitions.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Test Equipment Calibration Requirements: contractors will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

A. Refer to DDC General Conditions for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the contractor for the equipment being tested. For example, the contractor shall ultimately be responsible for all standards testing equipment for the plumbing system in Division 22, A sufficient quantity of two-way radios shall be provided by the contractor.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the City of New York and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the City of New York upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment, if provided by the CxA, shall not become the property of the City of New York.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5˚F and a resolution of ±0.1˚F. Pressure sensors shall have an accuracy of ±2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

B. With assistance from the installing subcontractors, the CxA will prepare Pre-Functional Checklists for commissioned components, equipment, and systems

C. Red-lined Drawings:

1. Verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
4. Create the as-built drawings.

D. Operation and Service Data:

1. Provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
2. The CxA will review the O&M literature once for conformance to project requirements.
3. The CxA will receive a copy of the final approved O&M literature from the Contractor once corrections have been made by the subcontractor.

E. Demonstration and Instruction:

1. Provide demonstration and instruction as required by the specifications.

2. A complete instruction plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any instruction.
3. An instruction agenda for each instruction session must be submitted to the CxA one (1) week prior the instruction session.
4. The CxA shall be notified at least 72 hours in advance of scheduled tests so that testing may be observed by the CxA. A copy of the test record shall be provided to the CxA and Commissioner.
5. Engage a Factory-authorized service representative to orient facility's service personnel to adjust, operate, and maintain specific equipment.
6. Orient facility's service personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining equipment.
7. Review data in O&M Manuals.

3.2 CONTRACTOR'S PERFORMANCE

A. The Contractor shall have the following instruction responsibilities

B. Perform commissioning tests at the direction of the CxA

C. Attend construction phase controls coordination meetings.

D. Attend domestic water balancing review and coordination meetings.

E. Participate in Plumbing systems, assemblies, equipment, and component service orientation and inspection as directed by the CxA.

F. Provide information requested by the CxA for final commissioning documentation.

G. Include requirements for submittal data, operation and maintenance data, and instruction in each purchase order or sub-contract written.

H. Prepare preliminary schedule for Plumbing system orientations and inspections, operation and maintenance manual submissions, orientation sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion. Distribute preliminary schedule to commissioning team members.

I. Update schedule as required throughout the construction period.

J. During the startup and initial checkout process, execute the related portions of the pre-functional checklists for all commissioned equipment.

K. Assist the CxA in all verification and functional performance tests.

L. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

M. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA (45) days after submittal acceptance.

N. Coordinate with the CxA to provide (72) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.

O. Notify the CxA a minimum of (2) weeks in advance of the time for start of the balancing work. Attend the initial balancing meeting for review of the balancing procedures.

P. Participate in, and schedule vendors and subcontractors to participate in the instruction sessions.

Q. Provide written notification to the CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.

1. Plumbing equipment including backflow preventers, domestic water heaters, pumps, plumbing fixtures, and all other equipment furnished under Division 22.
2. Gas piping, sanitary waste and vent piping, storm drainage piping, sump pumps and, sewage ejectors.

R. The equipment supplier shall document the performance of his equipment.

S. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.

T. Perform Test, Adjust and Balance work:

1. Attend initial commissioning coordination meeting scheduled by the CxA.
2. Submit the site specific balancing plan to the CxA for review and acceptance.
3. Attend the balancing review meeting scheduled by the CxA. Be prepared to discuss the procedures that shall be followed in balancing the Plumbing system.
4. At the completion of the balancing work, and the submittal of the final balancing report, notify the CxA.
5. Participate in verification of the balancing report, which will consist of repeating measurements contained in the balancing reports. Assist in diagnostic purposes when directed.

U. Provide instruction of the facility's operating staff using qualified personnel, as specified.

V. Equipment Suppliers

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities, to keep warranties in force.
2. Assist in equipment testing per agreements with respective subcontractors.
3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

W. Refer to DDC General Conditions for additional contract and contractor responsibilities.

3.3 CxA's RESPONSIBILITIES

A. Refer to DDC General Conditions for CxA's Responsibilities.

3.4 TESTING PREPARATION

A. Certify in writing to the CxA that Plumbing systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that Plumbing instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify in writing that balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.5 DOMESTIC WATER BALANCING VERIFICATION

A. Prior to performance of Domestic Water Balancing work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least ten (10) days in advance of testing and balancing Work, and provide access for the CxA to witness balancing Work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of Plumbing systems at the direction of the CxA

1. The CxA will notify testing and balancing contractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
2. Use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final balancing report.
4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.6 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of Plumbing testing shall include entire Plumbing installation. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the subcontractor performing plumbing work and the subcontractor performing balancing work shall prepare detailed testing plans, procedures, and checklists for Plumbing systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the Plumbing system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.7 PLUMBING SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing and Acceptance requirements are specified in Division 22. Provide submittals, test data, inspector records, and certifications to the CxA.

B. Plumbing Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 22. Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests and chemical treatment: Prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA.

D. Plumbing Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of domestic water distribution system.

E. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

F. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and subsystems. The systems shall be evaluated shall include, but not limited to:

1. Domestic hot water heat recovery system
2. Fuel Gas System for Boilers

3.8 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUETO MANUFACTURER DEFECT

A. Refer to DDC General Conditions for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.9 APPROVAL

A. Refer to DDC General Conditions for requirements for approval procedures.

3.10 SEASONAL TESTING

A. Refer to DDC General Conditions for requirements pertaining to seasonal testing.

3.11 OPERATION AND MAINTENANCE MANUALS

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements.

B. Refer to DDC General Conditions for requirements for the Contractor and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.

3.12 INSTRUCTION OF FACILTY PERSONNEL

A. Refer to DDC General Conditions for requirements pertaining to instruction.

B. Instruction responsibilities:

1. Provide the CxA with an instruction plan two weeks before the planned instruction.
2. Provide the facility personnel with comprehensive orientation and instruction in the understanding of the systems and the operation and service of each piece of Plumbing equipment.
3. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary, and the demonstration repeated.
4. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing subcontractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the instruction.

5. The instruction sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
6. Hands-on instruction shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
7. Fully explain and demonstrate the operation, function and overrides of any local packaged controls.
8. Instruction shall occur after functional testing is complete, unless approved otherwise by the Commissioner.

END OF SECTION 220800

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Ductile-iron pipe and fittings.
3. Dielectric fittings.

B. Related Requirements:

1. Section 331415 "Site Water Distribution Piping" for water-service piping and water meters outside the building from source to the point where water-service piping enters the building.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Pipe and tube.
2. Fittings.
3. Joining materials.
4. Transition fittings.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Environmental Product Declaration: For each product.
4. Health Product Declaration: For each product.
5. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Coordination Drawings: Piping layout, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by City of New York unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Commissioner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Potable-water piping and components must comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tube: ASTM B88, Type K.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51.
2. Push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Standard: ASSE 1079.
2. Pressure Rating: 250 psig.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

3.3 EARTHWORK

A. Comply with requirements in Section 310000 "Earth Work" for excavating, trenching, and backfilling.

3.4 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground copper tube ductile-iron pipe in PE encasement according to ASTM A674 or AWWA C105/A21.5.

E. Install valves according to the following:

1. Section 220523.12 "Ball Valves for Plumbing Piping."
2. Section 220523.13 "Butterfly Valves for Plumbing Piping."
3. Section 220523.14 "Check Valves for Plumbing Piping."
4. Section 220523.15 "Gate Valves for Plumbing Piping."

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

G. Install domestic water piping level without pitch and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

L. Install piping to permit valve servicing.

M. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

N. Install piping free of sags and bends.

O. Install fittings for changes in direction and branch connections.

P. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

Q. Install pressure gauges on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gauges in Section 220519 "Meters and Gages for Plumbing Piping."

R. Install thermostats in hot-water circulation piping.

S. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.5 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools and procedure recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.

G. Push-on Joints for Copper Tubing: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.

H. Extruded-Tee Connections: Form tee in copper tube according to ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

I. Joint Construction for Grooved-End Copper Tubing: Make joints according to AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

J. Joint Construction for Grooved-End, Ductile-Iron Piping: Make joints according to AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

K. Joint Construction for Grooved-End Steel Piping: Make joints according to AWWA C606. Roll groove ends of pipe as specified. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

L. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

M. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.

N. Joints for PEX Tubing, ASTM: Join according to ASTM F1807 for metal insert and copper crimp ring fittings and ASTM F1960 for cold expansion fittings and reinforcing rings.

O. Joints for PEX Tubing, ASSE: Join according to ASSE 1061 for push-fit fittings.

P. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.6 INSTALLATION OF DIELECTRIC FITTINGS

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 Use dielectric flange kits.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.7 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for hangers, supports, and anchor devices in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Install hangers for copper ductile iron galvanized steel and stainless steel tubing and piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, 2014 NYC Building Code, 2014 NYC Plumbing Code, and NYC DOB requirements, whichever are most stringent.

C. Install vinyl-coated hangers for CPVC PVC and PP piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, 2014 NYC Building Code, 2014 NYC Plumbing Code, and NYC DOB requirements, whichever are most stringent.

D. Install vinyl-coated hangers for PEX tubing, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, 2014 NYC Building Code, 2014 NYC Plumbing Code, and NYC DOB requirements, whichever are most stringent.

E. Support horizontal piping within 12 inches of each fitting.

F. Support vertical runs of copper ductile iron galvanized steel and stainless steel tubing and piping to comply with MSS-58, 2014 NYC Building Code, 2014 NYC Plumbing Code, and NYC DOB requirements, whichever are most stringent.

G. Support vertical runs of CPVC PVC and PP-R piping to comply with manufacturer's written instructions, 2014 NYC Building Code, 2014 NYC Plumbing Code, and NYC DOB requirements, whichever are most stringent.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by NYC Plumbing Code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.9 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by NYC Department of Buildings inspector.
   b. During installation, notify Commissioner and the NYC Building Department of Buildings at least 72 hours before inspection must be made. Perform tests specified below in presence of the Commissioner or representatives of the NYC Department of Building:

      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for the NYC Department of Buildings inspector and Commissioner to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

   c. Reinspection: If the NYC Department of Buildings inspectors find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by the NYC Department of Buildings inspectors.

2. Piping Tests:

   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Hydrostatic testing and documentation of test results for polypropylene piping to be in accordance with the manufacturer's instructions and submitted to the manufacturer upon successful completion per warranty requirements.
   f. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   g. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or restored before using.
2. Use purging and disinfecting procedures prescribed by the New York City Plumbing Code; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to certified laboratory facility.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or restored before using.
2. Use purging procedures prescribed by NYC DOB or; if methods are not prescribed, follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to NYC DOB. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from NYC DOB.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Backflow preventers.
2. Strainers for domestic water piping.
3. Hose bibbs.
4. Wall hydrants.
5. Water-hammer arresters.
6. Trap-seal primer device.
7. Water meters.

B. Related Requirements:

1. Section 220519 "Meters and Gauges for Plumbing Piping" for thermometers, pressure gauges, and flow meters in domestic water piping.
2. Section 221116 "Domestic Water Piping" for water meters.
3. Section 230923.18 "Leak Detection Instruments" for leak detection devices related to HVAC applications.
4. Section 330519 "Ductile Iron Utility Pipe" for fire water-service backflow prevention devices.

1.3 DEFINITIONS

A. AMI: Advanced Metering Infrastructure.

B. AMR: Automatic Meter Reading.

C. FKM: A family of fluroelastomer materials defined by ASTM D1418.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Test and inspection reports.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Domestic water piping specialties intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), NSF 61 and NSF 372, or to be certified in compliance with NSF 61 and NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. WATTS.

b. Zurn Industries, LLC.
c. Apollo Flow Controls: Conbraco Industries Inc.
d. Or approved equal.

2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Accessories:

a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Double-Check, Backflow-Prevention Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Apollo Flow Controls; Conbraco Industries, Inc.
b. WATTS.
c. Zurn Industries, LLC.
d. Or approved equal.

2. Standard: ASSE 1015.
3. Operation: Continuous-pressure applications unless otherwise indicated.
4. Accessories:

a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.4 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Keckley Company.
b. WATTS.
c. Zurn Industries, LLC.
d. Or approved equal.

2. Pressure Rating: 125 psig minimum unless otherwise indicated.
3. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 and larger.
4. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
5. Screen: Stainless steel with round perforations unless otherwise indicated.

2.5 HOSE BIBBS

A. Hose Bibbs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. Woodford Manufacturing Company.
   c. Zurn Industries, LLC.
   d. Or approved equal.

2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Finished Rooms: Chrome or nickel plated.
10. Operation for Equipment Rooms: Wheel handle or operating key.
11. Include operating key with each operating-key hose bibb.
12. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.6 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. WATTS.
   c. Woodford Manufacturing Company.
   d. Zurn Industries, LLC.
   e. Or approved equal.

2. Pressure Rating: 125 psig.
3. Operation: Loose key.
4. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
5. Inlet: NPS 3/4 or NPS 1.

B. Nonfreeze Vacuum Breaker Wall Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. WATTS.
   c. Zurn Industries, LLC.
   d. Or approved equal.

2. Standard: ASSE 1019, Type A or Type B.
3. Type: Automatic draining with integral air-inlet valve.
4. Classification: Type A, for automatic draining with hose removed or Type B, for automatic draining with hose removed or with hose attached and nozzle closed.
5. Pressure Rating: 125 psig.
6. Operation: Loose key.
7. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
8. Inlet: NPS 1/2 or NPS 3/4.
9. Outlet: Exposed with garden-hose thread complying with ASME B1.20.7.

2.7 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. WATTS.
   c. Zurn Industries, LLC.
   d. Or approved equal.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.8 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. WATTS.
   c. Zurn Industries, LLC.
   d. Or approved equal.

2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Drainage-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. Precision Plumbing Products.

c. Zurn Industries, LLC.
d. Or approved equal.

2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
3. Size: NPS 1-1/4 minimum.
4. Material: Chrome-plated, cast brass.

2.9 WATER METERS

A. Turbine-Type Water Meters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Badger Meter, Inc.
b. Neptune Technology Group Inc.
c. Sensus
d. Or approved equal.

2. Standard: AWWA C701.
3. Body Design: Turbine; totalization meter.
4. Registration: In gallons or cubic feet as required by utility company.

a. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

1) System must be capable of transmitting data using AMR/AMI technology.

5. End Connections: Threaded or flanged.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF PIPING SPECIALTIES

A. Backflow Preventers: Install in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with the requirements of the NYC Plumbing Code and the NYC DEP.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Y-Pattern Strainers: For water, install on supply side of each control valve water pressure-reducing valve solenoid valve and pump.

C. Water-Hammer Arresters: Install in water piping in accordance with PDI-WH 201.

D. Supply-Type, Trap-Seal Primer Device: Install with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

E. Drainage-Type, Trap-Seal Primer Device: Install as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

3.3 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

3.5 IDENTIFICATION

A. Plastic Labels for Equipment: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Backflow preventers.
2. Wall hydrants.
3. Trap-seal primer device.
4. Water meters.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.6 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

D. Adjust each pressure vacuum breaker reduced-pressure-principle backflow preventer double-check, backflow-prevention assembly and double-check, detector-assembly backflow preventer in accordance with manufacturer's written instructions and the device's reference standard.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and inspections:

1. Test each pressure vacuum breaker reduced-pressure-principle backflow preventer double-check, backflow-prevention assembly and double-check, detector-assembly backflow preventeraccording to the NYC Plumbing Code and the NYC DEP requirements and the device's reference standard.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 221119

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Related Requirements:

1. Section 221329 "Sanitary Sewerage Pumps" for effluent and sewage pumps.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For hubless, single-stack drainage system. Include plans, elevations, sections, and details.

C. Coordination Drawings: Plans and elevations, or Building Information Model (BIM) drawn to scale, showing items described in this Section and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 FIELD CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by City of New York unless permitted under the following conditions and then only after arranging to provide temporary service in accordance with requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Commissioner's written permission.

1.8 WARRANTY

A. Furnish a one (1) year manufacturer's warranty for the entire sanitary waste, drainage, and venting system.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation are capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10 ft. head of water.
2. Waste, Force-Main Piping: 50 psig.

B. Seismic Performance: Soil, waste, and vent piping and support and installation to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTH WORK

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 310000 "Earth Work."

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping.

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch, and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

L. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.

2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: Two percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Waste Piping: Two percent downward in direction of flow.
3. Vent Piping: One percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping in accordance with ASTM A674 or AWWA C105/A 21.5.

O. Install stainless-steel piping in accordance with ASME A112.3.1.

P. Install aboveground copper tubing in accordance with CDA's "Copper Tube Handbook."

Q. Install aboveground ABS piping in accordance with ASTM D2661.

R. Install aboveground PVC piping in accordance with ASTM D2665.

S. Install engineered soil and waste and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of the New York City Plumbing Code.
2. Hubless, Single-Stack Drainage System: Comply with ASME B16.45 and hubless, single-stack aerator fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of the New York City Plumbing Code.

T. Install underground, ductile-iron, force-main piping according to AWWA C600.

1. Install buried piping inside building between wall and floor penetrations and connection to sanitary sewer piping outside building with restrained joints.
2. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
3. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.

U. Install underground, copper, force-main tubing in accordance with CDA's "Copper Tube Handbook."

1. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.

V. Install force mains at elevations indicated.

W. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping.

a. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

    a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
    b. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

3. Install drains in sanitary waste gravity-flow piping.

    a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

X. Do not enclose, cover, or put piping into operation until it is inspected and approved by inspectors of the NYC Department of Buildings.

Y. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Z. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

AA. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.4 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Caulked Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum caulked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints:

1. Join hubless, cast-iron soil piping in accordance with CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
c. Do not use pipe sections that have cracked or open welds.

E. Join stainless-steel pipe and fittings with gaskets in accordance with ASME A112.3.1.

F. Join copper tube and fittings with soldered joints in accordance with ASTM B828. Use ASTM B813, water-flushable, lead-free flux and ASTM B32, lead-free-alloy solder.

G. Grooved Joints: Cut groove ends of pipe in accordance with AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

H. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

I. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join in accordance with ASTM D2235 and ASTM D2661 appendixes.
3. PVC Piping: Join in accordance with ASTM D2855 and ASTM D2665 appendixes.

J. Joint Restraints and Sway Bracing:

1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:

a. Provide axial restraint for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
b. Provide rigid sway bracing for pipe and fittings 4 inches and larger, upstream and downstream of all changes in direction 45 degrees and greater.
c. Provide rigid sway bracing for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction and branch openings.

3.5 VALVE INSTALLATION

A. General valve installation requirements for general-duty valve installation are specified in the following Sections:

1. Section 220523.12 "Ball Valves for Plumbing Piping."
2. Section 220523.13 "Butterfly Valves for Plumbing Piping."
3. Section 220523.14 "Check Valves for Plumbing Piping."
4. Section 220523.15 "Gate Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install full-port ball valve for piping NPS 2 and smaller.
3. Install full port ball valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified in Section 221319 "Sanitary Waste Piping Specialties."

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for pipe hanger and support devices and installation.

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42 clamps.
6. Install individual, straight, horizontal piping runs:

    a. 100 Ft. and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Ft.: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Ft. if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Ft. or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52 spring hangers.

B. Install hangers for cast-iron steel stainless steel and copper soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58 and the requirements of the 2014 NYC Building Code, whichever are most stringent.

C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

D. Support vertical runs of cast-iron steel stainless steel and copper soil piping to comply with MSS SP-58, and the requirements of the 2014 NYC Building Code, whichever are most stringent.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by NYC Plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by the NYC Plumbing Code.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by NYC Plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Comply with requirements for backwater valves cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
6. Equipment: Connect waste piping as indicated.

    a. Provide shutoff valve if indicated and union for each connection.
    b. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.
2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections in accordance with the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Repair damage to adjacent materials caused by waste and vent piping installation.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Miscellaneous sanitary drainage piping specialties.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for preformed flashings.
2. Section 078413 "Penetration Firestopping" for through-penetration firestop assemblies.

1.3 DEFINITIONS

A. ABS: Acrylonitrile butadiene styrene.

B. PVC: Polyvinyl chloride.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show fabrication and installation details for frost-resistant vent terminals.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Cast-Iron Exposed Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. WATTS.
   c. Zurn Industries, LLC.
   d. Or approved equal.

2. Standard: ASME A112.36.2M.
3. Size: Same as connected drainage piping
4. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

2.2 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Floor-Drain, Inline Trap Seal:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. Josam Company.
   c. MIFAB, Inc.
   d. Or approved equal.

2. Description: Inline floor drain trap seal, forming a physical barrier to slow trap evaporation while not impeding flow from drain.
3. Material: Polymer.
4. Standard: Tested and certified in accordance with ASSE 1072.
5. Size: Same as floor drain outlet or strainer throat.

B. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Assemble open drain fittings and install with top of hub 2 inches above floor.

E. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

F. Install sleeve and sleeve seals with each riser and stack passing through floors with waterproof membrane.

G. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

H. Install wood-blocking reinforcement for wall-mounting-type specialties.

I. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.3 PIPING CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, to allow service and maintenance.

3.4 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 221319.13 - SANITARY DRAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Floor drains.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene styrene.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene.

D. PE: Polyethylene.

E. PP: Polypropylene.

F. PVC: Polyvinyl chloride.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 DRAIN ASSEMBLIES

A. Sanitary drains must bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary piping specialty components.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Zurn where directed on drawings or comparable product by one of the following:

a. Jay R. Smith Mfg. Co.
b. Josam Company.
c. WATTS.
d. Or approved equal.

2. Standard: ASME A112.6.3 with backwater valve.
3. Body Material: Gray iron

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
3. Set with grates depressed according to the following drainage area radii:

a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.

    a. Maintain integrity of waterproof membranes where penetrated.

5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

B. Install trench drains at low points of surface areas to be drained.

1. Set grates of drains flush with finished surface, unless otherwise indicated.

C. Comply with ASME A112.3.1 for installation of stainless-steel channel drainage systems.

1. Install on support devices, so that top will be flush with adjacent surface.

D. Install FRP channel drainage system components on support devices, so that top will be flush with adjacent surface.

E. Install plastic channel drainage system components on support devices, so that top will be flush with adjacent surface.

F. Install open drain fittings with top of hub 1 inch above floor.

3.3 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements in Section 221319 "Sanitary Waste Piping Specialties" for backwater valves, air admittance devices and miscellaneous sanitary drainage piping specialties.

C. Install piping adjacent to equipment to allow service and maintenance.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319.13

SECTION 221329 - SANITARY SEWERAGE PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Submersible sewage pumps.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
4. Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with manufacturer's written instructions for handling.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

2.2 SUBMERSIBLE SEWAGE PUMPS

A. Submersible, Quick-Disconnect, Double-Seal Sewage Pumps:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Flygt model 4*NP3102-455 or comparable product by one of the following:

    a. Stancor, Inc.
    b. Zoeller Company.
    c. Or approved equal.

2. Description: Factory-assembled and -tested sewage-pump unit with guide-rail supports.
3. Pump type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
4. Pump Casing: Cast iron, with open inlet, and discharge fittings for connection to guide-rail support.
5. Impeller: Statically and dynamically balanced, ASTM B 584, cast bronze, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
6. Pump and Motor Shaft: Stainless steel, with factory-sealed, grease-lubricated ball bearings.
7. Seals: Mechanical.
8. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

    a. Motor Housing Fluid: Oil.

9. Guide-Rail Supports:

    a. Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
    b. Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
    c. Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
    d. Pump Yoke: Motor- or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
    e. Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
    f. Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.
    g. Lifting Cable: Stainless steel; attached to pump and cover at manhole.

B. Capacities and Characteristics:

1. Refer to pump schedule on drawing P-700 for more information.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for plumbing piping to verify actual locations of sanitary drainage and vent piping connections before sewage pump installation.

3.3 INSTALLATION

A. Pump Installation Standards:

1. Comply with HI 1.4 for installation of centrifugal pumps.

B. Wiring Method: Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.4 CONNECTIONS

A. Comply with requirements for piping specified in Section 221316 "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test, inspect, and adjust components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Pumps and controls will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.7 ADJUSTING

A. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust control set points.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate controls and pumps.

END OF SECTION 221329

SECTION 221413 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hubless, cast-iron soil pipe and fittings.
2. Galvanized-steel pipe and fittings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 FIELD CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Commissioner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of storm drainage service.
2. Do not proceed with interruption of storm drainage service without Commissioner's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation are to be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.
2. Storm Drainage, Force-Main Piping: 50 psig.

B. Seismic Performance: Storm drainage piping and support and installation to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully functional after the seismic event."
2. Component Importance Factor: 1.5.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Charlotte Pipe and Foundry Company.
2. Tyler Pipe; a part of McWane family of companies.
3. AB&I Foundry Company
4. Or approved equal.

B. Pipe and Fittings:

1. Marked with CISPI collective trademark and NSF certification mark.
2. Standards: ASTM A888 and CISPI 301.

C. Standard, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Charlotte Pipe and Foundry Company.
b. Tyler Pipe; a subsidiary of McWane Inc.
c. AB&I Foundry Company
d. Or approved equal.

2. Marked with CISPI collective trademark and NSF certification mark.
3. Standards: ASTM C1277 and CISPI 310.
4. Description: Stainless steel corrugated shield with stainless steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.

D. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Charlotte Pipe and Foundry Company.
b. Tyler Pipe: a subsidiary of McWane Inc.
c. AB&I Foundry Company
d. Or approved equal.

2. Standard: ASTM C1277 or ASTM C1540.
3. Description: Stainless steel shield with stainless steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.

E. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. MG Piping Products Company.
    b. AB&I Foundry Company
    c. Charlotte Pipe and Foundry Company.
    d. Or approved equal.

2. Standard: ASTM A1056.
3. Description: Two-piece ASTM A48/A48M, cast-iron housing; stainless steel bolts and nuts; and ASTM C564, rubber sleeve with integral, center pipe stop.

2.3 GALVANIZED-STEEL PIPE AND FITTINGS

A. Galvanized-Steel Pipe: ASTM A53/A53M, Type E, standard-weight class. Include ends matching joining method.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. U.S. Steel.
    b. Wheatland Tube; Zekelman Industries.
    c. Allied Pipe & Tube
    d. Or approved equal.

B. Steel-Pipe Pressure Fittings:

1. Steel Pipe Nipples: Galvanized, ASTM A733, made of ASTM A53/A53M or ASTM A106/A106M, Schedule 40, seamless steel pipe. Include ends matching joining method.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

B. Install piping as indicated unless deviations from layout are approved on coordination drawings.

C. Install piping in concealed locations.

1. Piping installed in equipment rooms, service areas, and where indicated may be exposed.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Make changes in direction for piping using appropriate branches, bends, and long-sweep bends.

1. Do not change direction of flow more than 90 degrees.
2. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

M. Install piping at the following minimum slopes unless otherwise indicated.

1. Building Storm Drain: 1/4 inch per foot downward in direction of flow for piping NPS 3 and smaller; 1/8 inch per foot downward in direction of flow for piping NPS 4 and larger.

N. Install cast-iron soil piping in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Ch IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping in accordance with ASTM A674 or AWWA C105/A 21.5.

O. Install underground piping in accordance with ASTM D2321.

P. Install engineered controlled-flow drain specialties and storm drainage piping in locations indicated.

1. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.

Q. Install force mains at elevations indicated.

R. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping.
2. Install cleanouts in storm drainage gravity-flow piping in accessible locations.

a. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.

3. Install drains in storm drainage gravity-flow piping.

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by the inspectors of the N.Y.C.D.O.B.

T. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Hubless, Cast-Iron Soil Piping Coupled Joints: Join in accordance with CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
c. Do not use pipe sections that have cracked or open welds.

C. Grooved Joints: Cut groove ends of pipe in accordance with AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

D. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

E. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.

F. Joint Restraints and Sway Bracing:

1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:

   a. Provide axial restraint for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
   b. Provide rigid sway bracing for pipe and fittings 4 inches and larger, upstream and downstream of all changes in direction 45 degrees and greater.
   c. Provide rigid sway bracing for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction and branch openings.

3.4 INSTALLATION OF VALVES

A. General valve installation requirements for general-duty valve installations are specified in the following Sections:

1. Section 220523.12 "Ball Valves for Plumbing Piping."
2. Section 220523.13 "Butterfly Valves for Plumbing Piping."
3. Section 220523.14 "Check Valves for Plumbing Piping."
4. Section 220523.15 "Gate Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install shutoff valve on each sump pump discharge.
2. Install gate or full port ball valve for piping NS 2 and smaller.
3. Install gate or butterfly valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing-check valve, between pump and shutoff valve, on each sump pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Install backwater valves in accessible locations.

3.5 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for hangers, supports, and anchor devices specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install hangers for cast-iron galvanized-steel and copper soil tubing and piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58 and the requirements of the 2014 NYC Building Code.

C. Install hangers for ABS and PVC piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and ximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58 and the requirements of the 2014 NYC Building Code.

D. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

E. Support vertical cast-iron galvanized steel and copper tubing and piping to comply with MSS SP-58 and the requirements of the 2014 NYC Building Code, but as a minimum at base and at each floor.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections in accordance with the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed storm drainage piping.

3.8 FIELD QUALITY CONTROL

A. During installation, notify Commissioner and the NYC Department of Buildings at least 24 hours before inspection must be made. Perform tests specified below in presence of Commissioner or representatives of the NYC Department of Buildings.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by the NYC Department of Buildings inspector and Commissioner to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If the NYC Department of Buildings inspectors find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them the NYC Department of Building inspector.

D. Test storm drainage piping in accordance with procedures of the NYC Plumbing Code or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

    a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved.

    a. Expose work that was covered or concealed before it was tested.

3. Test Procedure:

    a. Test storm drainage piping on completion of roughing-in.
    b. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
    c. From 15 minutes before inspection starts until completion of inspection, water level must not drop.
    d. Inspect joints for leaks.

4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of NYC Plumbing Code or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved.

a. Expose work that was covered or concealed before it was tested.

2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials.

a. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

3.10 PROTECTION

A. Protect piping and drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day and when work stops.

C. Repair damage to adjacent materials caused by storm drainage piping installation.

END OF SECTION 221413

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. General-purpose roof drains.
2. Trench drains.
3. Cleanouts.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. General-purpose roof drains.
2. Trench drains.
3. Cleanouts.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 GENERAL-PURPOSE ROOF DRAINS

A. Cast-Iron Roof Drains:

1. Cast-Iron, General-Purpose Roof Drains:

a. Basis-of-Design Product: Subject to compliance with requirements, provide Zurn roof drain or comparable product by one of the following:

1) Jay R. Smith Mfg Co; a division of Morris Group International.
2) Josam Company.
3) Or approved equal.

b. Standard: ASME A112.6.4.
c. Body Material: Cast iron.
d. Dimension of Body: Nominal 14-to 16-inch diameter.
e. Dome Material: Cast iron.
f. Combination flashing ring and gravel stop.
g. Options:

1) Extension collars.

2.2 TRENCH DRAINS

A. Stainless Steel, Trench Drains

1. Stainless Steel, Exterior Trench Drains

a. Basis-of-Design Product: Subject to compliance with requirements, provide ACO Drain Type 484 Brickslot 100 Access Unit where directed on drawings or comparable product by one of the following:

1) Jay R. Smith Mfg. Co.
2) Josam Company
3) Zurn
4) Or approved equal.

b. Body Material: 11 Gauge Stainless Steel.
c. Dimension of Slot: 1/2" x 4.84"
d. Anti-shunt lugs to prevent lateral movement.

2.3 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Cast-Iron Exposed Cleanouts:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Jay R. Smith Mfg Co; a division of Morris Group International.
2) Josam Company.
3) Watts Water Technologies; a Watts company.
4) Zurn Industries, LLC.

5) Or approved equal.

b. Standard: ASME A112.36.2M.
c. Size: Same as connected branch.
d. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch No-hub, cast-iron soil pipe test tee as required to match connected piping.
e. Closure: Countersunk Countersunk or raised-head Raised head, brass cast-iron plastic plug.
f. Closure Plug Size: Same as, or not more than, one size smaller than cleanout size.

2. Cast-Iron Wall Cleanouts:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Jay R. Smith Mfg Co; a division of Morris Group International.
2) Josam Company.
3) Watts Water Technologies; a Watts company.
4) Zurn Industries, LLC.
5) Or approved equal.

b. Standard: ASME A112.36.2M. Include wall access.
c. Size: Same as connected drainage piping.
d. Body: No-hub, cast-iron soil pipe test tee as required to match connected piping.
e. Closure Plug:

1) Material: Cast iron.
2) Head: Countersunk.
3) Drilled and threaded for cover attachment screw.
4) Size: Same as, or not more than, one size smaller than cleanout size.

f. Wall-Access Cover Plate: Round, flat, chrome-plated brass or stainless steel cover plate with screw.

B. Trench Drains Cleanout Cover:

1. Stainless Steel, Trench Drain Cleanout Cover

a. Basis-of-Design Product: Subject to compliance with requirements, provide Type 443/444 Stainless Steel Brickslot 100 cleanout cover where directed on drawings or comparable product by one of the following:

1) Jay R. Smith Mfg. Co.
2) Josam Company
3) Zurn
4) Or approved equal.

b. Material: 11 Gauge Stainless Steel.
c. Anti-shunt lugs to prevent lateral movement.
d. 1/2" nominal opening.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install roof drains in accordance with roof membrane manufacturer's written installation instructions at low points of roof areas.

1. Install flashing collar or flange of roof drain to maintain integrity of waterproof membranes where penetrated.
2. Install expansion joints, if indicated, in roof drain outlets.
3. Position roof drains for easy access and maintenance.

B. Install cleanouts in aboveground piping and building drain piping in accordance with the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate cleanouts at minimum intervals of 100 feet for piping.
4. Locate cleanouts at base of each vertical storm piping conductor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

E. Assemble channel drainage system components in accordance with manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

F. Install through-penetration firestop assemblies for penetrations of fire- and smoke-rated assemblies.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

3.3 CONNECTIONS

A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.4 INSTALLATION OF FLASHING

A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

3.5 CLEANING

A. Clean piping specialties during installation and remove dirt and debris as work progresses.

3.6 PROTECTION

A. Protect piping specialties during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day and when work stops.

END OF SECTION 221423

SECTION 221463 - FACILITY STORM-WATER RETENTION TANKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Concrete, Storm-Water Retention Tanks

1.3 |SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for storm-water retention tanks.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

C. Engineering Services Submittal: For storm-water retention tanks.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For facility storm-water retention tanks, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
3. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."
4. ASTM A 36, "Standard Specification for Carbon Structural Steel."
5. ASTM A240, "Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications."
6. ASTM A 283, "Standard Specifications for Low and Intermediate Tensile Strength Carbon Steel Plates."
7. ASTM A 668, "Standard Specifications for Steel Forgings, Carbon and Alloy, for General Industrial Use."
8. ASTM AA 1011, "Standard Specification forSteel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability

C. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Co.

PART 2 - PRODUCTS

2.1 CONCRETE, STORM-WATER RETENTION TANKS

A. A reinforced concrete rainwater/stormwater tank with the number of compartments as shown on the construction documents will be provided. The concrete tank is to be constructed in accordance with Division 03 specifications.

B. The tank must be waterproofed by other trades using an approved ANSI/NSF 61 waterproofing system suitable for potable water systems.

C. The Contractor is responsible for the layout, locations, and elevations of all tank openings and components.

D. The Contractor must provide all of the required pipes, fittings, watertight sleeves, strainers, flanges, etc., as described above and for a complete installation.

E. Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Anchor tank supports and tanks to substrate.

1. Use steel or FRP straps over or around plastic tanks.

B. Install thermometers and pressure gages on water retention tanks and piping if indicated. Thermometers and pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."

C. Install the following devices on tanks where indicated:

1. Pressure relief valves.
2. Temperature and pressure relief valves.
3. Vacuum relief valves.
4. Tank vents on nonpressure tanks.
5. Connections to accessories.

D. After installing tanks with factory finish, inspect finishes and repair damages to finishes.

3.3 CONNECTIONS

A. Where installing piping adjacent to storm-water retention tanks, allow space for service and maintenance.

B. Connect water piping to water retention tanks with unions or flanges and with shutoff valves. Connect tank drains with shutoff valves and discharge over closest floor drains.

1. Valves NPS 2 and Smaller: Gate valves complying with requirements in Section 220523.15 "Gate Valves for Plumbing Piping," or ball valves complying with Section 220523.12 "Ball Valves for Plumbing Piping."
2. Valves NPS 2-1/2 and Larger: Gate valves complying with requirements in Section 220523.15 "Gate Valves for Plumbing Piping," or butterfly valves complying with requirements in Section 220523.13 "Butterfly Valves for Plumbing Piping."
3. Drain Valves: NPS 3/4 Gate valves complying with requirements in Section 220523.15 "Gate Valves for Plumbing Piping," or ball valves complying with Section 220523.12 "Ball Valves for Plumbing Piping." Include outlet with, or nipple in outlet with, ASME B1.20.7, 3/4-11.5NH thread for garden-hose service, threaded cap, and chain.
4. Water Piping Connections: Make connections to dissimilar metals with dielectric fittings. Dielectric fittings are specified in Section 221116 "Domestic Water Piping."

3.4 IDENTIFICATION

A. Identify system components.

END OF SECTION 221463

SECTION 223300 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Commercial, electric, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For energy efficiency.

C. Shop Drawings:

1. Include diagrams for power, signal, and control wiring.

D. Coordination Drawings: Equipment room drawing or BIM model, drawn to scale, on which the items described in this Section are shown and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for commercial domestic-water heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Certificates: For each type of commercial, electric, domestic-water heater.

C. Domestic-Water Heater Labeling: Certified and labeled by a qualified testing agency.

D. Source quality-control reports.

E. Field quality-control reports.

F. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include emergency, operation, and maintenance manuals.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Electric, Storage, Domestic-Water Heaters:

1) Storage Tank: Three years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.

B. Seismic Performance: Commercial, electric, domestic-water heaters must withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1.

D. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

E. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.

2.2 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:
1. Basis-of-Design Product: Subject to compliance with requirements, provide A.O. Smith DEL-30 or comparable product by one of the following:

a. A. O. Smith Corporation.
b. Bradford White Corporation.
c. Hubbell Water Heaters.
d. PVI; A WATTS Brand.
e. Or approved equal.

2. Standard: UL 1453.

2.3 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Expansion Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. A. O. Smith Corporation.
b. AMTROL, Inc.

c. TACO Comfort Solutions, Inc.
d. Or approved equal.

2. Source Limitations: Obtain domestic-water expansion tanks from single source from single manufacturer.
3. Description: Steel pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
4. Construction:

a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Air-Charging Valve: Factory installed.

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, in accordance with ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DOMESTIC-WATER HEATER INSTALLATION

A. Electric, Domestic-Water Heater Mounting: Install residential, electric, domestic-water heaters on domestic-water heater mounting bracket.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

B. Install electric, domestic-water heaters level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

C. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend domestic-water heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

D. Install pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend domestic-water heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

F. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

G. Install thermometers on inlet and outlet piping of residential, solar, electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

H. Assemble and install inlet and outlet piping manifold kits for multiple electric, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each electric, domestic-water heater outlet. Comply with requirements for valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping," and comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

I. Install pressure-reducing valve with integral bypass relief valve in electric, domestic-water booster-heater inlet piping and water hammer arrester in booster-heater outlet piping. Set pressure-reducing valve for outlet pressure of 25 psig. Comply with requirements for pressure-reducing valves and water hammer arresters specified in Section 221119 "Domestic Water Piping Specialties."

J. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

K. Fill electric, domestic-water heaters with water.

L. Charge domestic-water expansion tanks with air to required system pressure.

M. Install dielectric fittings in all locations where piping of dissimilar metals is to be joined. The wetted surface of the dielectric fitting contacted by potable water must contain less than 0.25 percent of lead by weight.

3.3 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.4 IDENTIFICATION

A. Identify system components.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 223300

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wall-mounted water closets.
2. Flushometer valves.
3. Toilet seats.
4. Supports.

1.3 DEFINITIONS

A. High-Efficiency Flush Volume: 1.28 gal. or less per flush.

B. WaterSense Fixture: Water closet and/or flushometer valve/tank certified by the EPA to meet the WaterSense performance criteria.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power and control wiring.

C. Sustainable Design Submittals:

1. Plumbing Fixtures: Provide the following:

a. Manufacturer cut sheet indicating water consumption.
b. WaterSense certification for residential fixtures, commercial water closets, commercial urinals, and commercial showers.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Standards:

1. Comply with ASME A112.19.2/CSA B45.1 for water closets.
2. Comply with ASME A112.19.5/CSA B45.15 for flush valves and spuds for water closets and tanks.
3. Comply with ASSE 1037/ASME A112.1037/CSA B125.37 for flush valves.
4. Comply with IAMPO/ANSI Z124.5 for water-closet (toilet) seats.
5. Comply with ASME A112.6.1M for water-closet supports.
6. Comply with the USDOJ's 2010 ADA Standards for Accessible Design & ICC A117.1-2009- for ADA-compliant water closets.
7. Comply with ASTM A1045 for flexible PVC gaskets used in connection of vitreous china water closets to sanitary drainage systems.
8. Comply with ASME A112.4.3 for plastic fittings used in connection of vitreous china water closets to sanitary drainage systems.

2.2 WALL-MOUNTED WATER CLOSETS

A. Water Closets - Wall Mounted, Back Spud: .

1. Basis-of-Design Product: Subject to compliance with requirements, provide TOTO water closet or comparable product by one of the following:

   a. American Standard.
   b. Zurn Industries, LLC.
   c. Or approved equal.

2. Source Limitations: Obtain water closets from single source from single manufacturer.
3. Bowl:

a. Material: Vitreous china.
b. Type: Siphon jet.
c. Style: Flushometer valve.
d. Mounting Height: ADA compliant.
e. Rim Contour: Elongated.
f. Water Consumption: 1.28 gal. per flush.
g. Spud Size and Location: NPS 1-1/2; back.
h. Color: White.

4. Toilet Seat: TOTO Commercial Toilet Seat.

2.3 FLUSHOMETER VALVES

A. Flushometer Valves - Piston, Sensor Operated, Battery Powered: .

1. Basis-of-Design Product: Subject to compliance with requirements, provide American Standard flushometer valve or comparable product by one of the following:

a. Sloan Valve Company.
b. Zurn Industries, LLC.
c. Or approved equal.

2. Source Limitations: Obtain flushometer valve from single source from single manufacturer.
3. Minimum Pressure Rating: 35 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Style: Concealed.
7. Exposed Flushometer-Valve Finish: Stainless Steel.
8. Panel Finish: Chrome-plated or stainless steel.
9. Consumption: 1.1 gal. per flush.

2.4 TOILET SEATS

A. Toilet Seats:

1. Basis-of-Design Product: Subject to compliance with requirements, provide TOTO toilet seat or comparable product by one of the following:

a. American Standard.
b. Zurn Industries, LLC.
c. Or approved equal.

2. Source Limitations: Obtain toilet seat from single source from single manufacturer.
3. Material: Plastic.
4. Type: Commercial (Heavy duty).
5. Shape: Elongated rim, open front.
6. Hinge Material: Noncorroding metal.

7. Color: White.

2.5 SUPPORTS

A. Water-Closet Carrier:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Jay R. Smith Mfg Co; a division of Morris Group International.
b. Josam Company.
c. WATTS.
d. Zurn Industries, LLC.
e. Or approved equal.

2. Source Limitations: Obtain water-closet carrier from single source from single manufacturer.
3. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for water-supply piping and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Water-Closet Installation:

1. Install level and plumb.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height in accordance with the USDOJ's 2010 ADA Standards for Accessible Deisgn & ICC A117.1-2009.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.

2. Use carrier supports with waste-fitting assembly and seal.
3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.
5. Measure support height installation from finished floor, not structural floor.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install actuators in locations easily reachable for people with disabilities.
4. Install new batteries in battery-powered, electronic-sensor mechanisms.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.4 PIPING CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.7 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install new batteries in battery-powered, electronic-sensor mechanisms.

3.8 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Commissioner.

END OF SECTION 224213.13

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Vitreous-china, wall-mounted lavatories.
2. Manually operated lavatory faucets.
3. Supply fittings.
4. Waste fittings.
5. Lavatory supports.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For water consumption.
2. Plumbing Fixtures: Provide the following:

a. Manufacturer cut sheet indicating water consumption.
b. WaterSense certification for residential fixtures, commercial water closets, commercial urinals, and commercial showers.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to closeout requirements per DDC General Conditions, include the following:

a. Servicing and adjustments of automatic faucets.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory - Rectangular, Vitreous China, Wall Mounted, with Back :

1. Basis-of-Design Product: Subject to compliance with requirements, provide American Standard lavatory, or comparable product by one of the following:

a. Kohler Co.
b. The Splash Lab
c. Or approved equal.

2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Type: For wall hanging.
c. Nominal Size: Rectangular, 18 21 by 20 inches (508 by 534 mm).
d. Faucet-Hole Punching: One hole.
e. Faucet-Hole Location: Top.
f. Color: White.

3. Lavatory Mounting Height: Accessible in accordance with the USDOJ's 2010 ADA Standards for Accessible Design & ICC A117.1-2009.

2.2 MANUALLY OPERATED LAVATORY FAUCETS

A. Lavatory faucets intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61/NSF 372, or be certified in compliance with NSF 61/NSF 372 by an American National Standards Institute (ANSI) accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. Lavatory Faucets - Manual Type: Single-Control Mixing, Commercial:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Chicago lavatory faucet, or comparable product by one of the following:

    a. Speakman
    b. Delta
    c. Or approved equal.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: Single hole.
5. Body Material: Commercial, solid-brass, or die-cast housing with brazed copper and brass waterway.
6. Finish: Polished chrome plate.
7. Maximum Flow: 0.35 gpm.
8. Valve Handle(s): Single lever .
9. Spout: Rigid type.

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

2.4 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4.
2. Material:

    a. Chrome-plated, one-piece, cast-brass trap with swivel 0.029-inch- thick tubular brass wall bend; and chrome-plated, brass or steel wall flange.

2.5 LAVATORY SUPPORTS

A. Lavatory Carrier:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Jay R. Smith Mfg Co; a division of Morris Group International.
    b. Josam Company.
    c. WATTS.
    d. Zurn Industries, LLC.
    e. Or approved equal.

2. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install lavatories level and plumb in accordance with roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at accessible mounting height for people with disabilities or the elderly, in accordance with the USDOJ's 2010 ADA Standards for Accessible Design & ICC A117.1-2009.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.4 PIPING CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Install new batteries in battery-powered, electronic-sensor mechanisms.

3.7 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Commissioner.

END OF SECTION 224216.13

SECTION 224713 - DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Drinking fountains.
2. Supports.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountain and bottle filling station.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Plumbing Fixtures: Provide the following:

a. Manufacturer cut sheet indicating water consumption.
b. WaterSense certification for commercial drinking fountains.

C. Shop Drawings:

1. Include diagrams for power wiring.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains and bottle filling stations to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Standards:

1. Drinking fountains and bottle filling stations intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), and with NSF 61 or NSF 372, or be certified in compliance with NSF 61 or NSF 372 by an ANSI-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.
2. Comply with ASME A112.19.3/CSA B45.4 for stainless steel drinking fountains and bottle filling stations.
3. Comply with ASME A112.19.2/CSA B45.1 for vitreous china drinking fountains.
4. Comply with NSF 42 and NSF 53 for water filters for drinking fountains and bottle filling stations.
5. Comply with the USDOJ's 2010 ADA Standards for Accessible Design & ICC A117.1-2009, for accessible drinking fountains and bottle filling stations.

2.2 DRINKING FOUNTAINS

A. Drinking Fountains - Surface Wall-Mounted, Stainless Steel:.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Filtrine drinking fountain or comparable product by one of the following:

    a. Haws Corporation.
    b. Elkay.
    c. Or approved equal.

2. Source Limitations: Obtain surface wall-mounted, stainless steel drinking fountains from single source from single manufacturer.
3. Type: Vandal resistant.
4. Receptor(s):

    a. Type: With back.
    b. Shape: Round.

5. Control: Push button.
6. Supply: NPS 3/8 with shutoff valve.
7. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 chrome-plated brass P-trap and waste.
8. Filter: One or more water filters with capacity sized for unit peak flow rate.
9. Electrical Characteristics:

a. Volts: 120 V ac.
b. Phase: Single.
c. Hertz: 60 Hz.

10. Support: Provide manufacturer's mounting plate and drinking fountain carrier.
11. Drinking Fountain Mounting Height: Accessible in accordance with the USDOJ's 2010 ADA Standards for Accessible Design & ICC A117.1-2009.

2.3 SUPPORTS

A. Drinking Fountain Carrier:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company.
b. WATTS.
c. Zurn Industries, LLC.
d. Or approved equal.

2. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by NYC DOB.

B. Set pedestal drinking fountains and bottle filling stations on flat surface in accordance with manufacturer's written installation instructions.

C. Install recessed, drinking fountains and bottle filling stations secured to wood blocking in wall construction.

D. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

E. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping"

F. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

G. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

H. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.4 PIPING CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball shutoff valve on water supply to each fixture. Install valve upstream from filter for drinking fountain. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping"

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.5 ELECTRICAL CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

C. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplates to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplates to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.7 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Commissioner.

END OF SECTION 224713

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 33 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F .

J. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 ADDITIONAL REQUIREMENTS FOR POLYPHASE MOTORS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width-modulated inverters.
2. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.

4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp must be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device will automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

SECTION 230516 - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Packless expansion joints.
2. Alignment guides and anchors.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Engineering Services Submittals: For each anchor and alignment guide, including analysis data, signed and sealed by the qualified professional engineer licensed in the State of New York, responsible for their preparation.

1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For expansion joints.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

C. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Compatibility: Provide products suitable for piping service fluids, materials, working pressures, and temperatures.

B. Capability: Provide products and installations that will accommodate maximum axial movement as scheduled or indicated on Drawings.

2.2 PACKLESS EXPANSION JOINTS

A. Flexible-Hose Packless Expansion Joints :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Flex-Hose Co., Inc.
    b. Flexicraft Industries.
    c. Flex-Pression.
    d. Flex-Weld; a division of Kelco.
    e. Kadant Unaflex, LLC.
    f. Mason Industries, Inc.
    g. Metraflex Company (The).
    h. Proco Products, Inc.
    i. Unisource Manufacturing, Inc.
    j. Or approved equal.

2. Source Limitations: Obtain flexible-hose packless expansion joints from single manufacturer.
3. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
4. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
5. Expansion Joints for Copper Tubing NPS 2 and Smaller: Copper-alloy fittings with solder-joint end connections.

    a. Bronze hoses and double-braid bronze sheaths with 700 psig at 70 deg F and 500 psig at 450 deg F ratings.

6. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4: Copper-alloy fittings with threaded end connections.

    a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 420 psig at 70 deg F and 315 psig at 450 deg F ratings.

7. Expansion Joints for Steel Piping NPS 2 and Smaller: Carbon-steel fittings with threaded end connections.

    a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 700 psig at 70 deg F and 515 psig at 600 deg F ratings.

8. Expansion Joints for Steel Piping NPS 2-1/2 to NPS 6: Carbon-steel fittings with flanged end connections.

    a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 275 psig at 70 deg F and 200 psig at 600 deg F ratings.

9. Expansion Joints for Steel Piping NPS 8 to NPS 12: Carbon-steel fittings with flanged end connections.

    a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F and 120 psig at 600 deg F ratings.

10. Expansion Joints for Steel Piping NPS 14 and Larger: Carbon-steel fittings with flanged end connections.

    a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F and 120 psig at 600 deg F ratings.

2.3 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Advanced Thermal Systems, Inc.
    b. Amber/Booth Company, Inc.; a VMC Group Company.
    c. Flex-Hose Co., Inc.
    d. Flexicraft Industries.
    e. Flex-Pression.
    f. Flex-Weld, Inc.
    g. Hyspan Precision Products, Inc.
    h. Mason Industries, Inc.
    i. Metraflex Company (The).
    j. Or approved equal.

2. Source Limitations: Obtain alignment guides from single manufacturer.

3. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding slider for bolting to pipe.

B. Anchor Materials:

1. Steel Shapes and Plates: ASTM A36/A36M.
2. Bolts and Nuts: ASME B18.10 or ASTM A183, steel hex head.
3. Washers: ASTM F844, steel, plain, flat washers.
4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.

    a. Stud: Threaded, zinc-coated carbon steel.
    b. Expansion Plug: Zinc-coated carbon steel.
    c. Washer and Nut: Zinc-coated carbon steel.

5. Chemical Fasteners: Insert-type stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.

    a. Bonding Material: ASTM C881/C881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
    b. Stud: ASTM A307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
    c. Washer and Nut: zinc-coated carbon steel.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF EXPANSION JOINTS - GENERAL

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

3.3 INSTALLATION OF PACKLESS EXPANSION JOINTS

A. Install metal-bellows packless expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."

B. Install rubber packless expansion joints according to FSA-PSJ-703.

3.4 INSTALLATION OF ALIGNMENT GUIDES AND ANCHORS

A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install two guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

C. Attach guides to pipe, and secure guides to building structure.

D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

E. Anchor Attachments:

1. Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9.
2. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-58, Type 24; U bolts bolted to anchor.

F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.

1. Anchor Attachment to Steel Structural Members: Attach by welding.
2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

3.5 INSTALLATION OF PIPE LOOPS AND SWING CONNECTIONS

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

END OF SECTION 230516

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Sleeves without waterstop.
2. Sleeves with waterstop.
3. Stack-sleeve fittings.
4. Sleeve-seal systems.
5. Silicone sealants.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SLEEVES WITHOUT WATERSTOP

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends.

B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, hot-dip galvanized, with plain ends.

C. Steel Sheet Sleeves: ASTM A653/A653M, 0.0239-inch minimum thickness; hot-dip galvanized, round tube closed with welded longitudinal joint.

2.2 SLEEVES WITH WATERSTOP

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, LLC.
2. CALPICO, Inc.
3. GPT; an EnPro Industries company.
4. Metraflex Company (The).
5. Or approved equal.

B. Description: Manufactured PVC/HDPE, steel, stainless steel, galvanized steel, sleeve-type, waterstop assembly, made for imbedding in concrete slab or wall.

2.3 STACK-SLEEVE FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Jay R. Smith Mfg Co; a division of Morris Group International.
2. Wade; a subsidiary of McWane Inc.
3. Zurn Industries, LLC.
4. Or approved equal.

B. Description: Manufactured, cast-iron sleeve with integral cast flashing flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.4 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, LLC.
2. CALPICO, Inc.
3. GPT; an EnPro Industries company.

4. Metraflex Company (The).
5. Proco Products, Inc.
6. Or approved equal.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Designed to form a hydrostatic seal of 20 psig .
2. Sealing Elements: EPDM-rubber High-temperature-silicone Nitrile (Buna N) interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size.
3. Pressure Plates: Carbon steel Composite plastic Stainless steel Stainless steel, Type 316.
4. Connecting Bolts and Nuts: Carbon steel, with ASTM B633 coating Stainless steel Stainless steel, Type 316, of length required to secure pressure plates to sealing elements.

2.5 SILICONE SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.
b. Polymeric Systems, Inc.
c. Sherwin-Williams Company (The).
d. Sika Corporation.
e. The Dow Chemical Company.
f. Tremco Incorporated.
g. Or approved equal.

2. Standard: ASTM C920, Type S, Grade NS, Class 25, Use NT.
3. Sealant must have a VOC content of 250 g/L or less.
4. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using silicone sealant, seal space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use sealants appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke-Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 INSTALLATION OF SLEEVES WITH WATERSTOP

A. Install sleeve with waterstop as new walls and slabs are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using silicone sealant, seal space around outside of sleeves.

3.3 INSTALLATION OF STACK-SLEEVE FITTINGS

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 3 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using waterproof silicone sealant, seal space between top hub of stack-sleeve fitting and pipe.

B. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.4 INSTALLATION OF SLEEVE-SEAL SYSTEMS

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building, and passing through exterior walls.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal-system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
2. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.6 SLEEVE SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above and below Grade:

    a. Sleeves with waterstops.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Concrete Slabs-on-Grade:

    a. Sleeves with waterstops.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:

    a. Sleeves with waterstops.

4. Interior Walls and Partitions:

    a. Sleeves without waterstops.

END OF SECTION 230517

SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Filled-system thermometers.
3. Liquid-in-glass thermometers.
4. Light-activated thermometers.
5. Duct-thermometer mounting brackets.
6. Thermowells.
7. Dial-type pressure gages.
8. Gage attachments.
9. Test plugs.
10. Test-plug kits.
11. Sight flow indicators.
12. Flowmeters.
13. Thermal-energy meters.

B. Related Requirements:

1. Section 231123 "Facility Natural-Gas Piping" for gas meters.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 FILLED-SYSTEM THERMOMETERS

A. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ashcroft Inc.
    b. Marsh Bellofram.
    c. Miljoco Corporation.
    d. Palmer Wahl Instrumentation Group.
    e. REOTEMP Instrument Corporation.
    f. Trerice, H. O. Co.
    g. Weiss Instruments, Inc.
    h. Or approved equal.

2. Standard: ASME B40.200.
3. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, dampening type, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Stainless steel.
10. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.

    a. Air-Duct Installation: With ventilated shroud.
    b. Thermowell Installation: Bare stem.

12. Accuracy: Plus or minus 1 percent of scale range.

B. Remote-Mounted, Metal-Case, Vapor-Actuated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Ametek U.S. Gauge.
   b. Ashcroft Inc.
   c. Marsh Bellofram.
   d. Miljoco Corporation.
   e. Palmer Wahl Instrumentation Group.
   f. REOTEMP Instrument Corporation.
   g. Trerice, H. O. Co.
   h. Weiss Instruments, Inc.
   i. WIKA Instrument Corporation.
   j. Or approved equal.

2. Standard: ASME B40.200.
3. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch nominal diameter with back flange and holes for panel mounting.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Stainless steel.
10. Connector Type(s): Union joint, back; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.

    a. Air-Duct Installation: With ventilated shroud.
    b. Thermowell Installation: Bare stem.

12. Accuracy: Plus or minus 1 percent of scale range.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Ashcroft (Dial-Type)
   b. Dynalco (Dial-Type)
   c. Trerice, H. O. Co.
   d. Marsh Instruments (Marsh Bellofram)
   e. Miljoco
   f. Weiss
   g. Weksler

h. Or approved equal.

2. Standard: ASME B40.200.
3. Case: Cast aluminum; 6-inch nominal size.
4. Case Form: Back angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass or plastic.
8. Stem: Aluminum or brass and of length to suit installation.

   a. Air-Duct Installation: With ventilated shroud.
   b. Thermowell Installation: Bare stem.

9. Connector: 3/4 inch , with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 LIGHT-ACTIVATED THERMOMETERS

A. Direct-Mounted, Light-Activated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Flo Fab inc.
   b. REOTEMP Instrument Corporation.
   c. Trerice, H. O. Co.
   d. Weiss Instruments, Inc.
   e. Weksler Glass Thermometer Corp.
   f. WIKA Instrument Corporation.
   g. Winters Instruments - U.S.
   h. Or approved equal.

2. Case: Metal; 7-inch nominal size unless otherwise indicated.
3. Scale(s): Deg F.
4. Case Form: Adjustable angle.
5. Connector: 1-1/4 inches , with ASME B1.1 screw threads.
6. Stem: Aluminum and of length to suit installation.

   a. Air-Duct Installation: With ventilated shroud.
   b. Thermowell Installation: Bare stem.

7. Display: Digital.
8. Accuracy: Plus or minus 2 deg F.

B. Remote-Mounted, Light-Activated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Miljoco Corporation.
b. Weiss Instruments, Inc.
c. Winters Instruments - U.S.
d. Or approved equal.

2. Case: Plastic, for wall mounting.
3. Scale(s): Deg F.
4. Sensor: Bulb and thermister wire.

a. Air-Duct Installation: With ventilated shroud.
b. Thermowell Installation: Bare stem.

5. Display: Digital.
6. Accuracy: Plus or minus 2 deg F.

2.4 DUCT-THERMOMETER MOUNTING BRACKETS

A. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

2.5 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion in piping tee fitting.
3. Material for Use with Copper Tubing: CUNI.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.6 DIAL-TYPE PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ametek U.S. Gauge.
b. Ashcroft Inc.

c. Ernst Flow Industries.
d. Flo Fab inc.
e. Marsh Bellofram.
f. Miljoco Corporation.
g. Noshok.
h. Palmer Wahl Instrumentation Group.
i. REOTEMP Instrument Corporation.
j. Tel-Tru Manufacturing Company.
k. Trerice, H. O. Co.
l. Watts; a Watts Water Technologies company.
m. Weiss Instruments, Inc.
n. Weksler Glass Thermometer Corp.
o. WIKA Instrument Corporation.
p. Winters Instruments - U.S.
q. Or approved equal.

2. Standard: ASME B40.100.
3. Case: Sealed type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi .
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

B. Remote-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ametek U.S. Gauge.
b. Ashcroft Inc.
c. Ernst Flow Industries.
d. Flo Fab inc.
e. Marsh Bellofram.
f. Miljoco Corporation.
g. Noshok.
h. Palmer Wahl Instrumentation Group.
i. REOTEMP Instrument Corporation.
j. Tel-Tru Manufacturing Company.
k. Trerice, H. O. Co.
l. Watts; a Watts Water Technologies company.
m. Weiss Instruments, Inc.
n. WIKA Instrument Corporation.
o. Winters Instruments - U.S.
p. Or approved equal.

2. Standard: ASME B40.100.
3. Case: Sealed type; cast aluminum or drawn steel; 4-1/2-inch nominal diameter with back flange and holes for panel mounting.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi .
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.7 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston -type surge-dampening device. Include extension for use on insulated piping.

B. Siphons: Loop-shaped section of brass pipe with NPS 1/4 or NPS 1/2 pipe threads.

C. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

2.8 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. Nexus Valve, Inc.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Company, Inc.
6. Trerice, H. O. Co.
7. Watts; a Watts Water Technologies company.
8. Weiss Instruments, Inc.
9. Weksler Glass Thermometer Corp.
10. Or approved equal.

B. Description: Test-station fitting made for insertion in piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

F. Core Inserts: EPDM self-sealing rubber.

2.9 TEST-PLUG KITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. Nexus Valve, Inc.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Company, Inc.
6. Trerice, H. O. Co.
7. Watts; a Watts Water Technologies company.
8. Weiss Instruments, Inc.
9. Or approved equal.

B. Furnish one test-plug kit(s) containing one thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes must be of diameter to fit test plugs and of length to project into piping.

C. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial range must be at least 25 to 125 deg F.

D. High-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial range must be at least 0 to 220 deg F.

E. Pressure Gage: Small, Bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range must be at least 0 to 200 psig .

F. Carrying Case: Metal or plastic, with formed instrument padding.

2.10 SIGHT FLOW INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ARCHON Industries, Inc.
2. Dwyer Instruments, Inc.
3. Emerson Process Management; Rosemount Division.
4. Ernst Flow Industries.
5. John C. Ernst Co., Inc.
6. KOBOLD Instruments, Inc. - USA.
7. OPW Engineered Systems; OPW Fluid Transfer Group; a Dover company.
8. Pentair Valves & Controls; Penberthy Brand.
9. Or approved equal.

B. Description: Piping inline-installation device for visual verification of flow.

C. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.

D. Minimum Pressure Rating: 150 psig .

E. Minimum Temperature Rating: 200 deg F.

F. End Connections for NPS 2 and Smaller: Threaded.

G. End Connections for NPS 2-1/2 and Larger: Flanged.

2.11 FLOWMETERS

A. Orifice Flowmeters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB.
   b. Bell & Gossett; a Xylem brand.
   c. Meriam Process Technologies.
   d. Preso Meters.
   e. S. A. Armstrong Limited.
   f. Or approved equal.

2. Description: Flowmeter with sensor, hoses or tubing, fittings, valves, indicator, and conversion chart.
3. Flow Range: Sensor and indicator must cover operating range of equipment or system served.
4. Sensor: Wafer-orifice-type, calibrated, flow-measuring element; for installation between pipe flanges.

   a. Design: Differential-pressure-type measurement for water.
   b. Construction: Cast-iron body, brass valves with integral check valves and caps, and calibrated nameplate.
   c. Minimum Pressure Rating: 300 psig .
   d. Minimum Temperature Rating: 250 deg F.

5. Permanent Indicators: Meter suitable for wall or bracket mounting, calibrated for connected sensor and having 6-inch- diameter, or equivalent, dial with fittings and copper tubing for connecting to sensor.

   a. Scale: Gallons per minute .
   b. Accuracy: Plus or minus 1 percent between 20 and 80 percent of scale range.

6. Portable Indicators: Hand-held, differential-pressure type, calibrated for connected sensor and having two 12-foot hoses, with carrying case.

   a. Scale: Gallons per minute .
   b. Accuracy: Plus or minus 2 percent between 20 and 80 percent of scale range.

7. Display: Shows rate of flow, with register to indicate total volume in gallons .
8. Conversion Chart: Flow rate data compatible with sensor and indicator.
9. Operating Instructions: Include complete instructions with each flowmeter.

B. Pitot-Tube Flowmeters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB.
    b. Emerson Process Management; Rosemount Division.
    c. Meriam Process Technologies.
    d. Nexus Valve, Inc.
    e. Preso Meters.
    f. TACO Incorporated.
    g. Veris Inc.
    h. Or approved equal.

2. Description: Flowmeter with sensor and indicator.
3. Flow Range: Sensor and indicator must cover operating range of equipment or system served.
4. Sensor: Insertion type; for inserting probe in piping and measuring flow directly in gallons per minute.

    a. Design: Differential-pressure-type measurement for water.
    b. Construction: Stainless-steel probe of length to span inside of pipe, with integral transmitter and direct-reading scale.
    c. Minimum Pressure Rating: 150 psig .
    d. Minimum Temperature Rating: 250 deg F.

5. Indicator: Hand-held meter; either an integral part of sensor or a separate meter.
6. Integral Transformer: For low-voltage power connection.
7. Accuracy: Plus or minus 3 percent.
8. Display: Shows rate of flow, with register to indicate total volume in gallons .
9. Operating Instructions: Include complete instructions with each flowmeter.

C. Venturi Flowmeters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Gerand Engineering Co.
    b. Hyspan Precision Products, Inc.
    c. Preso Meters.
    d. Victaulic Company.
    e. Or approved equal.

2. Description: Flowmeter with calibrated flow-measuring element, hoses or tubing, fittings, valves, indicator, and conversion chart.
3. Flow Range: Sensor and indicator must cover operating range of equipment or system served.
4. Sensor: Venturi-type, calibrated, flow-measuring element; for installation in piping.

    a. Design: Differential-pressure-type measurement for water.
    b. Construction: Bronze, brass, or factory-primed steel, with brass fittings and attached tag with flow conversion data.
    c. Minimum Pressure Rating: 250 psig .

d. Minimum Temperature Rating: 250 deg F.
e. End Connections for NPS 2 and Smaller: Threaded.
f. End Connections for NPS 2-1/2 and Larger: Flanged or welded.
g. Flow Range: Flow-measuring element and flowmeter must cover operating range of equipment or system served.

5. Permanent Indicators: Meter suitable for wall or bracket mounting, calibrated for connected flowmeter element, and having 6-inch- diameter, or equivalent, dial with fittings and copper tubing for connecting to flowmeter element.

a. Scale: Gallons per minute .
b. Accuracy: Plus or minus 1 percent between 20 and 80 percent of scale range.

6. Portable Indicators: Hand-held, differential-pressure type, calibrated for connected flowmeter element and having two 12-foot hoses, with carrying case.

a. Scale: Gallons per minute .
b. Accuracy: Plus or minus 2 percent between 20 and 80 percent of scale range.

7. Display: Shows rate of flow, with register to indicate total volume in gallons .
8. Conversion Chart: Flow rate data compatible with sensor.
9. Operating Instructions: Include complete instructions with each flowmeter.

2.12 THERMAL-ENERGY METERS

A. Impeller-Turbine, Thermal-Energy Meters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hoffer Flow Controls, Inc.
b. ISTEC Corporation.
c. ONICON Incorporated.
d. Veris Industries.
e. Or approved equal.

2. Description: System with strainer, flow sensor, temperature sensors, transmitter, indicator, and connecting wiring.
3. Flow Sensor: Impeller turbine with corrosion-resistant-metal body and transmitter; for installing in piping.

a. Design: Total thermal-energy measurement.
b. Minimum Pressure Rating: 150 psig .
c. Minimum Temperature Range: 40 to 250 deg F.

4. Temperature Sensors: Insertion-type transducer.
5. Indicator: Solid-state, integrating-type meter with integral battery pack; for wall mounting.

a. Data Output: Six-digit electromechanical counter with readout in kilowatts per hour or British thermal units .

6. Accuracy: Plus or minus 1 percent.
7. Display: Visually indicates total fluid volume in gallons and thermal-energy flow in kilowatts per hour or British thermal units .
8. Strainer: Full size of main line piping.
9. Operating Instructions: Include complete instructions with each thermal-energy meter system.

B. Ultrasonic, Thermal-Energy Meters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. EMCO Flow Systems.
   b. Emerson
   c. Flexim
   d. Siemens Industry, Inc.
   e. Or approved equal.

2. Description: Meter with flow sensor, temperature sensors, transmitter, indicator, and connecting wiring.
3. Flow Sensor: Transit-time ultrasonic type with transmitter.
4. Temperature Sensors: Insertion-type or strap-on transducer.
5. Indicator: Solid-state, integrating-type meter with integral battery pack.

   a. Data Output: Six-digit electromechanical counter with readout in kilowatts per hour or British thermal units .

6. Accuracy: Plus or minus 1 percent.
7. Display: Visually indicates total fluid volume in gallons and thermal-energy flow in kilowatts per hour or British thermal units .
8. Operating Instructions: Include complete instructions with each thermal-energy meter system.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.

H. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

I. Install remote-mounted pressure gages on panel.

J. Install valve and snubber in piping for each pressure gage for fluids (except steam).

K. Install valve and syphon fitting in piping for each pressure gage for steam.

L. Install test plugs in piping tees.

M. Install flow indicators in piping systems in accessible positions for easy viewing.

N. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions.

O. Install flowmeter elements in accessible positions in piping systems.

P. Install wafer-orifice flowmeter elements between pipe flanges.

Q. Install differential-pressure-type flowmeter elements, with at least minimum straight lengths of pipe, upstream and downstream from element according to manufacturer's written instructions.

R. Install permanent indicators on walls or brackets in accessible and readable positions.

S. Install connection fittings in accessible locations for attachment to portable indicators.

T. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.

U. Install thermometers in the following locations:

1. Inlet and outlet of each hydronic zone.
2. Inlet and outlet of each hydronic boiler.
3. Outside-, return-, supply-, and mixed-air ducts.

V. Install pressure gages in the following locations:

1. Discharge of each pressure-reducing valve.
2. Suction and discharge of each pump.

3.3 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow space for service and maintenance of meters, gages, machines, and equipment.

B. Connect flowmeter-system elements to meters.

C. Connect flowmeter transmitters to meters.

D. Connect thermal-energy meter transmitters to meters.

3.4 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.5 THERMOMETER SCHEDULE

A. Thermometers at inlet and outlet of each hydronic zone must be one of the following:

1. Direct -mounted, metal -case, vapor-actuated type.
2. Compact -style, liquid-in-glass type.
3. Direct -mounted, light-activated type.
4. Test plug with EPDM self-sealing rubber inserts.

B. Thermometers at inlet and outlet of each hydronic boiler must be one of the following:

1. Direct -mounted, metal -case, vapor-actuated type.
2. Compact -style, liquid-in-glass type.
3. Direct -mounted, light-activated type.
4. Test plug with EPDM self-sealing rubber inserts.

C. Thermometers at outside-, return-, supply-, and mixed-air ducts must be one of the following:

1. Liquid-filled, bimetallic-actuated type.
2. Remote-mounted, metal -case, vapor-actuated type.
3. Compact -style, liquid-in-glass type.
4. Remote-mounted, light-activated type.

D. Thermometer stems must be of length to match thermowell insertion length.

3.6 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 20 to 240 deg F.

B. Scale Range for Air Ducts: 20 to 240 deg F.

3.7 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each pressure-reducing valve must be one of the following:

1. Sealed, direct -mounted, metal case.
2. Sealed, direct -mounted, plastic case.
3. Test plug with EPDM self-sealing rubber inserts.

B. Pressure gages at suction and discharge of each pump must be one of the following:

1. Sealed, direct -mounted, metal case.
2. Sealed, direct -mounted, plastic case.
3. Test plug with EPDM self-sealing rubber inserts.

3.8 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 0 to 200 psi .

3.9 FLOWMETER SCHEDULE

A. Flowmeters for Heating, Hot-Water Piping: Venturi type.

3.10 THERMAL-ENERGY METER SCHEDULE

A. Thermal-Energy Meters for Heating, Hot-Water Piping: Ultrasonic type.

END OF SECTION 230519

SECTION 230523.12 - BALL VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Steel ball valves.
3. Stainless steel ball valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. RPTFE: Reinforced polytetrafluoroethylene.

C. SWP: Steam working pressure.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and weld ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on steel valves.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for cast copper solder-joint connections.
6. ASME B16.22 for wrought copper and copper alloy solder-joint connections.
7. ASME B16.34 for flanged and threaded end connections.
8. ASME B31.1 for power piping valves.
9. ASME B31.9 for building services piping valves.

B. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

C. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 4 and larger.
2. Hand Lever: For quarter-turn valves smaller than NPS 4.

F. Valves in Insulated Piping:

1. Provide 2-inch extended neck stems.
2. Extended operating handles with nonthermal-conductive covering material, and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, Two Piece with Full Port and Stainless Steel Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Crane; a Crane Co. brand.
    c. Hammond Valve.
    d. Jenkins Valves; a Crane Co. brand.
    e. Milwaukee Valve Company.
    f. NIBCO INC.
    g. Stockham; a Crane Co. brand.
    h. WATTS.
    i. Or approved equal.

2. Standard: MSS SP-110.
3. SWP Rating: 150 psig.
4. CWP Rating: 600 psig.
5. Body Design: Two piece.
6. Body Material: Bronze.
7. Ends: Threaded or soldered.
8. Seats: PTFE.
9. Stem: Stainless steel.
10. Ball: Stainless steel, vented.
11. Port: Full.

B. Bronze Ball Valves, Two Piece with Regular Port and Stainless Steel Trim, Threaded Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Center Line; a Crane Co. brand.
    c. Hammond Valve.
    d. Jenkins Valves; a Crane Co. brand.
    e. Milwaukee Valve Company.
    f. NIBCO INC.
    g. Stockham; a Crane Co. brand.
    h. Or approved equal.

2. Standard: MSS SP-110.

3. SWP Rating: 150 psig.
4. CWP Rating: 600 psig.
5. Body Design: Two piece.
6. Body Material: Bronze.
7. Ends: Threaded.
8. Seats: PTFE.
9. Stem: Stainless steel.
10. Ball: Stainless steel, vented.
11. Port: Regular.

2.4 STEEL BALL VALVES

A. Steel Ball Valves with Full Port and Stainless Steel Trim, Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Bray International, Inc.
    c. Hammond Valve.
    d. Jamesbury; Metso.
    e. Milwaukee Valve Company.
    f. NIBCO INC.
    g. Stockham; a Crane Co. brand.
    h. WATTS.
    i. Or approved equal.

2. Standard: MSS SP-72.
3. CWP Rating: 285 psig.
4. Body Design: Split body.
5. Body Material: Carbon steel, ASTM A216/A216M, Type WCB.
6. Ends: Flanged.
7. Seats: PTFE.
8. Stem: Stainless steel.
9. Ball: Stainless steel, vented.
10. Port: Full.

2.5 STAINLESS STEEL BALL VALVES

A. Stainless Steel Ball Valves, Two Piece with Full Port, Threaded or Flanged Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. A.Y. McDonald Mfg. Co.
    b. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    c. Bray International, Inc.
    d. FNW; Ferguson Enterprises, Inc.
    e. Hammond Valve.
    f. Jomar Valve.

g. Or approved equal.

2. Standard: MSS SP-110.
3. CWP Rating: 200 psig.
4. Body Design: Split body.
5. Body Material: Type 316 stainless steel.
6. Ends: Threaded or flanged.
7. Seats: PTFE.
8. Stem: Type 316 stainless steel.
9. Ball: Type 316 stainless steel.
10. Port: Full.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow space for service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full valve actuation movement.

F. Valve Tags: Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for valve tags and schedules.

G. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's recommended maximum.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves exhibiting leakage.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified SWP classes or CWP ratings are unavailable, provide the same types of valves with higher SWP classes or CWP ratings.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.
7. For Stainless Steel Piping, NPS 2 and Smaller: Threaded ends.
8. For Stainless Steel Piping,NPS 2-1/2 to NPS 4: Flanged ends.

3.6 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller: bronze ball valves, two piece with stainless steel trim, full port, and solder -joint ends.

B. Pipe NPS 2-1/2 and Larger:

1. Iron ball valves, Class 125.

    a. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.

2. Steel ball valves, Class 150.

END OF SECTION 230523.12

SECTION 230523.13 - BUTTERFLY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. High-performance butterfly valves.
2. Chainwheels.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: ABS, Buna-N, or nitrile butadiene rubber.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set butterfly valves closed or slightly open.

B. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1.7 QUALITY ASSURANCE

A. Refer to DDC Geneal Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B16.5 for flanges on steel valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B31.1 for power piping valves.
5. ASME B31.9 for building services valves.

B. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

C. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valve Actuator Types:

1. Gear Actuator: For valves NPS 8 and larger.
2. Hand Lever: For valves NPS 6 and smaller.
3. Chainwheel: Device for attachment to gear, stem, or other actuator of size and with chain for mounting height, according to "Installation of Valves" Article.

F. Valves in Insulated Piping: Provide with 2-inch extended neck stems.

2.3 HIGH-PERFORMANCE BUTTERFLY VALVES

A. Single-Flange (Lug-Type), High-Performance Butterfly Valves, Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABZ Valve and Controls.
b. Apollo Valves; a part of Aalberts Integrated Piping Systems.
c. Bray International, Inc.
d. DeZURIK.
e. Emerson Commercial & Residential Solutions; Emerson Electric Co.
f. Flowseal; Crane Energy Flow Solutions.
g. Hammond Valve.
h. Jamesbury; Metso.
i. Milwaukee Valve Company.
j. Stockham; a Crane Co. brand.
k. Or approved equal.

2. Standard: MSS SP-68.
3. CWP Rating: 285 psig at 100 deg F.
4. Body Design: Single flange (lug type), suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
5. Body Material: Carbon steel.
6. Seat: Reinforced PTFE or metal.
7. Stem: Stainless steel; offset from seat plane.
8. Disc: Type 316 stainless steel.
9. Service: Bidirectional.

2.4 CHAINWHEELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Babbitt Steam Specialty Co.
2. Roto Hammer Industries; Rotork.
3. Trumbull Industries.
4. Or approved equal.

B. Description: Valve actuation assembly with sprocket rim, chain guides, chain, and attachment brackets for mounting chainwheels directly to hand wheels.

1. Sprocket Rim with Chain Guides: Ductile or cast iron , of type and size required for valve. Include zinc or epoxy coating.
2. Chain: Hot-dip, galvanized steel , of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine mating flange faces for damage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

D. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow space for service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full valve actuation movement.

F. Install chainwheels on manual actuators for butterfly valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

G. Valve Tags: Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for valve tags and schedules.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service, but before final adjusting and balancing. If leakage cannot be repaired, replace valve.

3.5 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 and Larger:

1. High-Performance Butterfly Valves: Single flange, carbon-steel body, and Class 150.

END OF SECTION 230523.13

SECTION 230523.14 - CHECK VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Bronze swing check valves.
2. Iron swing check valves.
3. Iron, center-guided check valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene-propylene-diene monomer.

C. NBR: Nitrile butadiene rubber (also known as "Buna-N").

D. SWP: Steam working pressure.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, press connections, and weld ends.
3. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use stems or other components as lifting or rigging points unless specifically indicated for this purpose in manufacturer's written instructions.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges for metric standard piping.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for cast copper solder joint.
6. ASME B16.22 for wrought copper solder joint.
7. ASME B16.51 for press joint.
8. ASME B31.1 for power piping valves.
9. ASME B31.9 for building services piping valves.

B. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

C. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are unacceptable.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valve Bypass and Drain Connections: MSS SP-45.

2.3 BRONZE SWING CHECK VALVES

A. Bronze Swing Check Valves with Bronze Disc, Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Valves; a Crane Co. brand.
b. Hammond Valve.
c. Jenkins Valves; a Crane Co. brand.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Powell Valves.
g. Or approved equal.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 300 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

2.4 IRON SWING CHECK VALVES

A. Iron Swing Check Valves with Metal Seats, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Valves; a Crane Co. brand.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. Powell Valves.
e. Or approved equal.

2. Description:

a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. NPS 14 to NPS 24, CWP Rating: 150 psig.
d. Body Design: Clear or full waterway.
e. Body Material: ASTM A126, gray iron with bolted bonnet.
f. Ends: Flanged.
g. Trim: Bronze.
h. Gasket: Asbestos free.

2.5 IRON, CENTER-GUIDED CHECK VALVES

A. Iron, Globe, Center-Guided Check Valves with Metal Seat, Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DFT Inc.
b. Flomatic Valves.
c. Metraflex Company (The).
d. Or approved equal.

2. Description:

a. Standard: MSS SP-125.
b. NPS 2-1/2 to NPS 12, CWP Rating: 300 psig.
c. NPS 14 to NPS 24, CWP Rating: 250 psig.
d. Body Material: ASTM A395/A395M or ASTM A536, ductile iron.
e. Style: Globe, spring loaded.
f. Ends: Flanged.
g. Seat: Bronze.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Examine press fittings to verify they have been properly pressed.

F. Do not attempt to repair defective valves; replace with new valves.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access and where not blocked by equipment, other piping, or building components.

D. Install valves with stem at or above center of pipe.

E. Install valves in position that does not project into aisles or block access to other equipment.

F. Install valves in position to allow full stem and manual operator movement.

G. Verify that joints of each valve have been properly installed and sealed to ensure that there is no leakage or damage.

H. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Center-Guided Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

I. Install valve tags. Comply with requirements for valve tags and schedules in Section 230553 "Identification for HVAC Piping and Equipment."

J. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve of manufacturer's recommended maximum.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Pump-Discharge Check Valves:

a. NPS 2 and Smaller: Bronze swing check valves with bronze disc.
b. NPS 2-1/2 and Larger: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal-seat check valves.

B. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. End Connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends, except where solder-joint or press valve-end option is indicated in valve schedules.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends, except where threaded valve-end option is indicated in valve schedules.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends, except where threaded valve-end option is indicated in valve schedules.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.
7. For Grooved-End Steel Piping, except Steam and Steam Condensate Piping: Valve ends may be grooved.
8. Wafer-Type Valves: Flanged connections.

3.6 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Bronze swing check valves with bronze disc, Class 150.

B. Pipe NPS 2-1/2 and Larger:

1. NPS 2-1/2 to NPS 4: Iron valves may be provided with threaded ends instead of flanged ends.
2. NPS 2-1/2 to NPS 12: Iron swing check valves with lever and spring-closure control, Class 125.
3. Iron swing check valves with metal seats, Class 125.
4. Iron, globe, center-guided check valves with metal seat, Class 150.
5. Iron, single-plate check valves with resilient seat, Class 125.
6. Iron, dual-plate check valves with metal seat, Class 150.
7. Iron, dual-plate check valves with resilient seat, Class 150.

C. CPVC Pipe NPS 2 and Smaller: CPVC ball check valve.

D. PVC Pipe NPS 2 and Smaller: PVC ball check valve.

END OF SECTION 230523.14

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe stands.
6. Equipment stands.
7. Equipment supports.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
3. Section 230548.13 "Vibration Controls for HVAC" for vibration isolation devices.
4. Section 233113 "Metal Ducts" for duct hangers and supports.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Environmental Product Declaration (EPD): For each product.

C. Shop Drawings: Signed and sealed by a qualified professional engineer licensed in the State of New York. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.

D. Engineering Services Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC Geneal Conditions Section 014000 "Quality Requirements."

B. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions to engineer trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for HVAC piping and equipment must withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Engineer supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Engineer equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated, or epoxy powder-coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel .

B. Stainless Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel .

C. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-plated steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel .

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 PLASTIC PIPE HANGERS

A. Description: Similar to MSS SP-58, Types 1 through 58, factory-fabricated steel pipe hanger except hanger is made of plastic.

B. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel .

C. Flammability: ASTM D635, ASTM E84, and UL 94.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Buckaroos, Inc.
2. CADDY; a brand of nVent.
3. Carpenter & Paterson, Inc.
4. KB Enterprise.
5. National Pipe Hanger Corporation.

6. Pipe Shields Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.
10. Or approved equal.

B. Insulation-Insert Material for Cold Piping: ASTM C552, Type II cellular glass with 100-psi or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psi minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100-psi ASTM C552, Type II cellular glass with 100-psi or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psi minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield must cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield must cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type anchors for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. B-line, an Eaton business.
b. Empire Tool and Manufacturing Co., Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head; Illinois Tool Works, Inc.
e. MKT Fastening, LLC.
f. Or approved equal.

2. Indoor Applications: Zinc-coated steel.
3. Outdoor Applications: Stainless steel.

2.7 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. MIRO Industries.
b. PHP Systems/Design.
c. RectorSeal HVAC; a CSW Industrials Company.
d. Rooftop Support Systems, a division of Eberl Iron Works, Inc.
e. Or approved equal.

2. Description: Single base unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
3. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
4. Hardware: Galvanized steel or polycarbonate.
5. Accessories: Protection pads.

C. Low-Profile, Single Base, Single-Pipe Stand:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. MIRO Industries.
b. PHP Systems/Design.
c. Rooftop Support Systems, a division of Eberl Iron Works, Inc.
d. Or approved equal.

2. Description: Single base with vertical and horizontal members, and pipe support, for roof installation without membrane protection.
3. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
4. Vertical Members: Two, galvanized -steel, continuous-thread 1/2-inch rods.
5. Horizontal Member: Adjustable horizontal, galvanized -steel pipe support channels.
6. Pipe Supports: Roller.
7. Hardware: Galvanized steel.
8. Accessories: Protection pads.
9. Height: 12 inches above roof.

D. High-Profile, Multiple-Pipe Stand:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. MIRO Industries.
b. PHP Systems/Design.
c. RectorSeal HVAC; a CSW Industrials Company.
d. Rooftop Support Systems, a division of Eberl Iron Works, Inc.
e. Or approved equal.

2. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
3. Bases: Two or more; vulcanized rubber.
4. Vertical Members: Two or more, stainless-steel channels.
5. Horizontal Members: One or more, adjustable height, stainless-steel pipe support.
6. Pipe Supports: Roller.
7. Hardware: Stainless steel.

8. Accessories: Protection pads, 1/2-inch continuous-thread rod.
9. Height: 36 inches above roof.

E. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.9 OUTDOOR EQUIPMENT STANDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. MIRO Industries.
2. RectorSeal HVAC; a CSW Industrials Company.
3. Rooftop Support Systems, a division of Eberl Iron Works, Inc.
4. Or approved equal.

B. Description: Individual foot supports with elevated adjustable channel cross bars and clamps/fasteners/bolts for ground or roof supported outdoor equipment components, without roof membrane penetration, in a pre-fabricated system that can be modularly-assembled on site.

1. Foot Material: Rubber or polypropylene.
2. Rails Material: Hot dip galvanized carbon steel.
3. Wind/Sliding Load Resistance: Up to 100 mph minimum.

2.10 MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Threaded Rods: Continuously threaded. Zinc-plated or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar materials as rods.

F. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

3.3 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A36/A36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields must span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.

d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.4 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.5 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.6 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.7 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.8 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use stainless steel pipe hangers and stainless steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
8. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
9. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
10. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.

11. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
12. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
13. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
14. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is unnecessary.
15. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is unnecessary.
16. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.

10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230546 - COATINGS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes application of coating systems on internal HVAC components and external equipment surfaces, including the following systems:

1. Bake-cured corrosion-resistant coating systems.
2. Air-dried corrosion-resistant coating systems.

1.3 DEFINITIONS

A. Salt Water Acetic Acid Test (SWAAT): A salt fog-spray test of corrosion resistance performed in accordance with ASTM G85, Annex 3.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include Safety Data Sheets, preparation requirements, and application instructions.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.

1.5 INFORMATIONAL SUBMITTALS

A. Source Quality-Control Reports:

1. Certification of coating material testing.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in clean, dry, well-ventilated areas with ambient temperatures continuously maintained between 50 and 75 deg F.

1. Keep containers out of direct sunlight; avoid excessive heat and keep from freezing.
2. Maintain containers in clean condition, free of foreign materials and residue.
3. Remove rags and waste from storage areas daily.

1.8 CONDITIONS FOR COATING APPLICATION

A. Comply with manufacturer's recommendations regarding required temperature and humidity ranges during coating application.

PART 2 - PRODUCTS

2.1 CORROSION-RESISTANT COATING SYSTEMS, GENERAL

A. Material Compatibility:

1. Provide materials for application within each coating system that are compatible with one another and with metal substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coating material in coating system, submit compatibility certification from manufacturer of each coating product that products are compatible with substrate base material and with substrate-coating products applied as earlier coats.
3. Products must be of same manufacturer for each coat in a coating system.

B. Colors: Manufacturer's standard.

C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings must comply with VOC content limits of 2014 NYC Building Codes and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Rust-Preventive Coatings: 100 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings must comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. VOC Emissions: For field applications inside the building, wall paints must contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde must not exceed half of the indoor recommended exposure limit or 33 mcg/cu. m and that of acetaldehyde must not exceed 9 mcg/cu. m.

2.2 BAKE-CURED CORROSION-RESISTANT COATING SYSTEMS

A. Base Coat Performance Requirements:

1. Corrosion Resistance: ASTM B117: 3500 hours.
2. Cross-Hatch Adhesion: ASTM D3359: 5B .
3. SWAAT: ASTM G85: 1000 hours.
4. Cyclic Weathering: ISO 12944-9, 4200 hours.
5. Mandrel Flexibility: ASTM D522/D522M: 1/2 inch without cracking or delamination of film after full cure.
6. Adhesion - Elcometer: ASTM D4541: 1100 psi .
7. Impact: ASTM D2794.

    a. Direct Hit: 100 lb.-in. .
    b. Reverse Hit: 50 lb.-in. .

8. pH Range, 14-Day Liquid Spot Test: 2.4 to 12.6 .
9. Dry Heat Resistance: ASTM D2485: 320 deg F maximum.
10. Dry Film Thickness: 0.5 to 1.2 mils .
11. Heat-Transfer Reduction: 1 percent maximum .
12. Hardness: ASTM D3363 Pencil Test: 2B-HB .

B. Bake-Cured Coating Acceptable for Equipment Serving Food-Preparation Areas: In accordance with NSF 51.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Heresite Protective Coatings.
    b. Modine Manufacturing Company.
    c. Blygold America.
    d. Or approved equal.

C. Bake-Cured Top Coat Performance Requirements: Provide product with UV shielding properties, color stability, and maintenance of manufacturer's standard sheen, after exposure to outdoor conditions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Heresite Protective Coatings.
b. Modine Manufacturing Company.
c. Blygold America.
d. Or approved equal.

D. Bake-Cured, Immersion-Applied Phenolic Epoxy System.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Heresite Protective Coatings.
b. Modine Manufacturing Company.
c. Blygold America.
d. Or approved equal.

E. Baked-Cured, Immersion-Applied Epoxy Coating System.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Heresite Protective Coatings.
b. Modine Manufacturing Company.
c. Blygold America.
d. Or approved equal.

2.3 AIR-DRIED CORROSION-RESISTANT COATING SYSTEMS

A. Performance Requirements:

1. Corrosion Resistance: ASTM B117: 3500 hours.
2. Cross-Hatch Adhesion: ASTM D3359: 5B.
3. Cyclic Weathering: ISO 12944-9, Offshore Standard: 4200 hours.
4. Mandrel Flexibility: ASTM D522/D522M: 1/8 inch without cracking or delamination of film after full cure.
5. Impact: ASTM D2794.

a. Direct Hit: 100 in-lb.

6. Dry Heat Resistance: ASTM D2485: 356 deg F maximum.
7. Dry Film Thickness: 2 to 3 mils.
8. Heat-Transfer Reduction: 1 percent maximum.
9. Hardness: ASTM D3363 Pencil Test: 2B-HB.

B. Air-Dried, Spray-Applied Principle Coating System.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Heresite Protective Coatings.
b. Modine Manufacturing Company.
c. Blygold America

d. Or approved equal.

C. Air-Dried Phenolic System.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Heresite Protective Coatings.
b. Modine Manufacturing Company.
c. Blygold America
d. Or approved equal.

D. Air-Dried, Spray-Applied Coating System.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Heresite Protective Coatings.
b. Modine Manufacturing Company.
c. Blygold America
d. Or approved equal.

E. Air-Dried, Spray-Applied, Polyurethane Mixed with Aluminum Flakes System.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Blygold America.
b. Modine Manufacturing Company.
c. Energy Guard USA.
d. Or approved equal.

F. Base Coat Performance Requirements:

1. Corrosion Resistance: ASTM B117: 10,000 hours.
2. SWAAT: ASTM G85: 1000 hours.
3. Cyclic Weathering: ISO 12944-9: 4200 hours.
4. Cross-Hatch Adhesion: ASTM D3359: 5B .
5. Mandrel Flexibility: ASTM D522/D522M: 1/2 inch without cracking or delamination of film after full cure.
6. Adhesion - Elcometer: ASTM D4541: 1,100 psi Impact: ASTM D2794.

a. Direct Hit: 100 lb.-in. 160 lb.-in. .

7. Dry Heat Resistance: ASTM D2485: 250 deg F maximum.
8. Dry Film Thickness: 0.5 to 1.2 mils .
9. Heat-Transfer Reduction: 1 percent maximum.
10. Hardness: ASTM D3363 Pencil Test: 2B-HB .

G. Air-Dried Top Coat Performance Requirements: Provide product with UV shielding properties, color stability, and maintenance of manufacturer's standard sheen, after exposure to outdoor conditions.

2.4 SOURCE QUALITY CONTROL

A. Certification of Coating Material Testing: Submit manufacturer's test report of corrosion-resistance performance testing, as performed by a nationally recognized testing laboratory.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS\

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with coating manufacturer's requirements and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.

1. Thinning: Thin coating material with manufacturer's recommended thinning products when recommended or permitted by coating system manufacturer.

B. Comply with coating system manufacturer's recommendations to clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

3.4 APPLICATION

A. Verify with coating manufacturer whether coatings required must be applied and cured in factory-certified application shop.

B. Apply coating systems with equipment designed to deposit coating of specified uniform thickness over HVAC components, in complex, three-dimensional geometries.

1. Apply coatings with manufacturer-recommended tools and techniques suited for specified coating system and each coated HVAC component.
2. Do not apply coatings over labels or equipment name, identification, performance rating, or nomenclature plates.

C. Perform inspection and coating system manufacturer's recommended tests to verify coating integrity and thickness. Where coating was damaged by testing, repair damage in accordance with coating system manufacturer's written recommendations.

END OF SECTION 230546

SECTION 230548.13 - VIBRATION CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Open-spring isolators.
5. Housed-spring isolators.
6. Restrained-spring isolators.
7. Housed-restrained-spring isolators.
8. Pipe-riser resilient support.
9. Resilient pipe guides.
10. Elastomeric hangers.
11. Spring hangers.
12. Snubbers.
13. Restraints - rigid type.
14. Restraints - cable type.
15. Restraint accessories.
16. Post-installed concrete anchors.
17. Concrete inserts.
18. Vibration isolation equipment bases.
19. Restrained isolation roof-curb rails.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Include load rating for each wind-force-restraint fitting and assembly.

3. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and wind-force-restraint component.
4. Annotate to indicate application of each product submitted and compliance with requirements.
5. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Engineering Services Submittal:

1. For each wind-load protection device that is required by this Section or is indicated on Drawings, submit the following:

    a. Vibration Isolator and Wind-Load-Restraint Selection: Select vibration isolators, wind-load restraints, and vibration isolation bases complying with performance requirements, design criteria, and analysis data.
    b. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, and spring deflection changes. Include certification by professional engineer licensed in the State of New York that riser system was examined for excessive stress and that none exists.
    c. Concrete Anchors and Inserts: Include calculations showing anticipated wind loads.
    d. Wind-Load Design Calculations: Submit all static and dynamic loading calculations prepared under "Wind-Load Design Calculations" Paragraph in "Performance Requirements" Article.
    e. Qualified Professional Engineer: All submittals for wind-restraint calculations are to be signed and sealed by qualified New York State licensed professional engineer responsible for their preparation.

2. Wind-Restraint Detail Drawing:

    a. Design Analysis: To support selection and arrangement of wind restraints. Include calculations of combined tensile and shear loads.
    b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during wind events. Indicate association with vibration isolation devices.
    c. Coordinate vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply also with requirements in other Sections for equipment mounted outdoors.

3. All Engineering Services submittals for wind-restraint detail Drawings are to be signed and sealed by qualified New York State licensed professional engineer responsible for their preparation.
4. Product Listing, Preapproval, and Evaluation Documentation: By UL, showing maximum ratings of restraint items and basis for approval (tests or calculations).
5. Design Calculations for Vibration Isolation Devices: Calculate static and dynamic loading due to equipment weight and operating forces required to select proper vibration isolators, and to design vibration isolation bases.

6. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, and spring deflection changes. Include certification that riser system was examined for excessive stress and that none exists.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of vibration isolation device installation for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints.

B. Qualification Data: For testing agency.

C. Welding certificates.

D. Air-Spring Mounting System Performance Certification: Include natural frequency, load, and damping test data performed by an independent agency.

E. Field quality-control reports.

F. Wind-Force Performance Certification: Provide special certification for HVAC components subject to high wind exposure and impact damage and designated on Drawings or in the Specifications to require wind-force performance certification.

1. Provide equipment manufacturer's written certification for each designated HVAC device, stating that it will remain in place and operable following the design wind event and comply with all requirements of 2014 NYC Building Codes.
2. Provide manufacturer's written certification for each designated louver, damper, or similar device, stating that it will remain in place and protect opening from penetration of windborne debris and comply with all requirements of 2014 NYC Building Codes.
3. Certification must be based on ICC-ES or similar nationally recognized testing standard procedures.
4. The following HVAC systems and components require special certification for high wind performance. Written special certification of resistance to the effects of high wind force and impact damage must be provided by manufacturer:

    a. Rooftop AHU

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct testing indicated, be an NRTL as defined by OSHA in 29 CFR 1910.7.

C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Wind-Load-Restraint Device Load Ratings: Devices to be tested and rated in accordance with 2014 NYC Building Codes. Devices to be listed by a nationally recognized third party that requires periodic follow-up inspections and has a listing directory available to the public. Provide third-party listing by one or more of the following: UL product listing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design system.

1. Wind-Load Performance: Equipment must withstand the effects of high wind events determined in accordance with ASCE/SEI 7-16.

B. Wind-Load Design Calculations:

1. Perform calculations to obtain force information necessary to properly select wind-load-restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to the 2014 New York City Building codes and as presented in ASCE/SEI 7-16. Where "ASCE/SEI 7" is used throughout this Section, it is to be understood that the edition referred to in this subparagraph is intended as referenced throughout the Section Text unless otherwise noted.

    a. Factors indicated below that are specific to individual pieces of equipment must be obtained by Contractor and must be included in individual component submittal packages.
    b. Coordinate design wind-load calculations with vibration isolation requirements. Comply with requirements in other Sections in addition to those in this Section for equipment mounted outdoors.

2. Design wind pressure "p" for rooftop equipment is to be calculated by a qualified professional engineer licensed in the State of New York, using methods in ASCE/SEI 7-16, Ch. 30, PART 6: Building Appurtenances and Rooftop Structures and Equipment.

    a. Risk Category: II.
    b. h = Mean Roof Height: 40ft .
    c. V = Basic Wind Speed: 118mph.
    d. K_d = Wind Directionality Factor: 0.85.
    e. Exposure Category: B.
    f. K_{zt} = Topographic Factor: 1.0 .
    g. K_e = Ground Elevation Factor: 1.0.
    h. K_z = Velocity Pressure Exposure Coefficient (Evaluated at Height z): 0.85.
    i. K_h = Velocity Pressure Exposure Coefficient (Evaluated at Height h): 0.98.
    j. q_z = Velocity Pressure: Value calculated by a qualified professional engineer licensed in the State of New York providing wind-load calculations using methods detailed in ASCE/SEI 7-16 Section 26.10.1 or other source approved by NYC Department of Buildings.

k. q_h = Velocity Pressure: Value calculated by a qualified professional engineer licensed in the State of New York providing wind-load calculations using methods detailed in ASCE/SEI 7-16 Section 26.10.1 or other source approved by NYC Department of Buildings.
l. G = Gust-Effect Factor: 0.85.
m. Enclosure Classification: Partially open Buildings.
n. GCpi = Internal Pressure Coefficient: 0.18.

C. Consequential Damage: Provide additional restraints for suspended HVAC components or anchorage of floor-, roof-, or wall-mounted HVAC components as indicated in ASCE/SEI 7-16 so that failure of a non-essential or essential HVAC component will not cause the failure of any other essential architectural, mechanical, or electrical building component.

D. Fire/Smoke Resistance: All components that are not constructed of ferrous metals must have a maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by an NRTL in accordance with ASTM E84 or UL 723, and be so labeled.

E. Component Supports:

1. Load ratings, features, and applications of all reinforcement components must be based on testing standards of a nationally recognized testing agency.

2.2 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Ace Mountings Co., Inc.
b. Isolation Technology, Inc.
c. Kinetics Noise Control, Inc.
d. Korfund.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Management Corp.
h. Or approved equal.

2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
3. Size: Factory or field cut to match requirements of supported equipment.
4. Minimum deflection as indicated on Drawings.
5. Pad Material: Oil- and water-resistant rubber.
6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads.
8. Sandwich-Core Material: Resilient.

a. Infused nonwoven cotton or synthetic fibers.

2.3 ELASTOMERIC ISOLATION MOUNTS

A. Elastomeric Isolation Mounts:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Ace Mountings Co., Inc.
b. Isolation Technology, Inc.
c. Kinetics Noise Control, Inc.
d. Korfund.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Isolation.
h. Vibration Management Corp.
i. Vibration Mountings & Controls, Inc.
j. Or approved equal.

2. Mounting Plates:

a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

3. Minimum deflection as indicated on Drawings.
4. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Isolation Technology, Inc.
b. Kinetics Noise Control, Inc.
c. Korfund.
d. Mason Industries, Inc.
e. Vibration Eliminator Co., Inc.
f. Vibration Isolation.
g. Vibration Management Corp.
h. Vibration Mountings & Controls, Inc.
i. Or approved equal.

2. Description: All-directional isolator with restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

a. Housing: Cast-ductile iron or welded steel.

b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

3. Minimum deflection as indicated on Drawings.

2.5 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Ace Mountings Co., Inc.
b. Isolation Technology, Inc.
c. Kinetics Noise Control, Inc.
d. Korfund.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Isolation.
h. Vibration Management Corp.
i. Vibration Mountings & Controls, Inc.
j. Or approved equal.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates must limit floor load to 500 psi.
7. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
8. Minimum deflection as indicated on Drawings.

2.6 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Ace Mountings Co., Inc.
b. Isolation Technology, Inc.
c. Kinetics Noise Control, Inc.
d. Korfund.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Isolation.
h. Vibration Management Corp.
i. Vibration Mountings & Controls, Inc.

j. Or approved equal.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Minimum deflection as indicated on Drawings.
7. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.

    a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases must limit floor load to 500 psi.
    b. Top housing with threaded mounting holes and internal leveling device .

2.7 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Ace Mountings Co., Inc.
    b. Isolation Technology, Inc.
    c. Kinetics Noise Control, Inc.
    d. Mason Industries, Inc.
    e. Vibration Eliminator Co., Inc.
    f. Vibration Isolation.
    g. Vibration Management Corp.
    h. Vibration Mountings & Controls, Inc.
    i. Or approved equal.

2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

    a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases must limit floor load to 500 psi.
    b. Top plate with threaded mounting holes .
    c. Internal leveling bolt that acts as blocking during installation.

3. Restraint: Limit stop as required for equipment and 2014 NYC Building Codes.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
8. Minimum deflection as indicated on Drawings.

2.8 HOUSED-RESTRAINED-SPRING ISOLATORS

A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Ace Mountings Co., Inc.
b. Isolation Technology, Inc.
c. Kinetics Noise Control, Inc.
d. Mason Industries, Inc.
e. Vibration Eliminator Co., Inc.
f. Vibration Isolation.
g. Vibration Management Corp.
h. Vibration Mountings & Controls, Inc.
i. Or approved equal.

2. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.

a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases must limit floor load to 500 psi.
b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Minimum deflection as indicated on Drawings.

2.9 PIPE-RISER RESILIENT SUPPORT

A. All-Directional, Acoustical Pipe Anchor Consisting of Two Steel Tubes Separated by a Minimum 1/2-inch-Thick Neoprene:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Kinetics Noise Control, Inc.
b. Mason Industries, Inc.
c. Vibration Eliminator Co., Inc.
d. Vibration Management Corp.
e. Or approved equal.

2. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
3. Maximum Load Per Support: 500 psi on isolation material providing equal isolation in all directions.
4. Minimum deflection as indicated on Drawings.

2.10 RESILIENT PIPE GUIDES

A. Telescopic Arrangement of Two Steel Tubes or Post and Sleeve Arrangement Separated by a Minimum 1/2-inch- Thick Neoprene:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Kinetics Noise Control, Inc.
   b. Mason Industries, Inc.
   c. Vibration Eliminator Co., Inc.
   d. Vibration Management Corp.
   e. Vibration Mountings & Controls, Inc.
   f. Or approved equal.

2. Factory-Set Height Guide with Shear Pin: Shear pin must be removable and reinsertable to allow for selection of pipe movement. Guides must be capable of motion to meet location requirements.

2.11 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Ace Mountings Co., Inc.
   b. Kinetics Noise Control, Inc.
   c. Mason Industries, Inc.
   d. Vibration Eliminator Co., Inc.
   e. Vibration Isolation.
   f. Vibration Management Corp.
   g. Vibration Mountings & Controls, Inc.
   h. Or approved equal.

2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
3. Damping Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel-to-steel contact.
4. Minimum deflection as indicated on Drawings.

2.12 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Ace Mountings Co., Inc.
    b. Kinetics Noise Control, Inc.
    c. Mason Industries, Inc.
    d. Vibration Eliminator Co., Inc.
    e. Vibration Isolation.
    f. Vibration Management Corp.
    g. Vibration Mountings & Controls, Inc.
    h. Or approved equal.

2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Minimum deflection as indicated on Drawings.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
8. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
9. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
10. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

2.13 SNUBBERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Kinetics Noise Control, Inc.
2. Mason Industries, Inc.
3. Vibration Management Corp.
4. Vibration Mountings & Controls, Inc.
5. Or approved equal.

B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Post-Installed Concrete Anchor Bolts: Secure to concrete surface with post-installed concrete anchors. Anchors to be prequalified in accordance with ACI 355.2 testing and designated in accordance with ACI 318-14 Ch. 17 for 2015 or 2018 IBC.
2. Preset Concrete Inserts: Prequalified in accordance with ICC-ES AC446 testing.
3. Anchors in Masonry: Design in accordance with TMS 402.
4. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
5. Resilient Cushion: Maximum 1/4-inch air gap, and minimum 1/4 inch thick.

2.14 RESTRAINTS - RIGID TYPE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. B-line, an Eaton business.
2. Hilti, Inc.
3. Isolation Technology, Inc.
4. TOLCO.
5. Unistrut; Part of Atkore International.
6. Vibration Mountings & Controls, Inc.
7. Or approved equal.

B. Description: Shop- or field-fabricated bracing assembly made of AISI S110-07-S1 slotted steel channels, ANSI/ASTM A53/A53M steel pipe as per NFPA 13, or other rigid steel brace member. Includes accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.15 RESTRAINTS - CABLE TYPE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. B-line, an Eaton business.
2. Loos & Co.
3. Vibration Mountings & Controls, Inc.
4. Or approved equal.

B. Restraint Cables: ASTM A492 stainless steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with fittings attached by means of poured socket, swaged socket, or mechanical (Flemish eye) loop.

C. Restraint cable assembly and cable fittings must comply with ASCE/SEI 19-10 . All cable fittings and complete cable assembly must maintain the minimum cable breaking force. U-shaped cable clips and wedge-type end fittings do not comply and are unacceptable.

2.16 RESTRAINT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. B-line, an Eaton business.
2. Hilti, Inc.
3. Loos & Co.
4. Mason Industries, Inc.
5. TOLCO.
6. Unistrut; Part of Atkore International.
7. Or approved equal.

B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings .

D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.17 POST-INSTALLED CONCRETE ANCHORS

A. Mechanical Anchor Bolts:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. B-line, an Eaton business.
b. Hilti, Inc.
c. Mason Industries, Inc.
d. Powers Fasteners.
e. Simpson Strong-Tie Co., Inc.
f. Unistrut; Part of Atkore International.
g. Or approved equal.

2. Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength for anchor and as tested according to ASTM E488/E488M.

B. Provide post-installed concrete anchors that have been prequalified for use in wind-load applications. Post-installed concrete anchors must comply with all requirements of ASCE/SEI 7-05, Ch. 13 ASCE/SEI 7-10, Ch. 13 ASCE/SEI 7-16, Ch. 13.

1. Prequalify post-installed anchors in concrete in accordance with ACI 355.2 or other approved qualification testing procedures.
2. Prequalify post-installed anchors in masonry in accordance with approved qualification procedures.

C. Expansion-type anchor bolts are not permitted for equipment in excess of 10 hp that is not vibration isolated.

1. Undercut expansion anchors are permitted.

2.18 CONCRETE INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. B-line, an Eaton business.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Powers Fasteners.
5. Simpson Strong-Tie Co., Inc.
6. Unistrut; Part of Atkore International.
7. Or approved equal.

B. Provide preset concrete inserts that are prequalified in accordance with ICC-ES AC466 testing.

C. Comply with ANSI/MSS SP-58.

2.19 VIBRATION ISOLATION EQUIPMENT BASES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. CADDY; a brand of nVent.
2. California Dynamics Corporation.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.
5. Novia; A Division of C&P.
6. Vibration Eliminator Co., Inc.
7. Vibration Isolation.
8. Vibration Management Corp.
9. Vibration Mountings & Controls, Inc.
10. Or approved equal.

B. Steel Rails: Factory-fabricated, welded, structural-steel rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide rails.

    a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A36/A36M. Rails must have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

C. Steel Bases: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.

a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A36/A36M. Bases must have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

2.20 RESTRAINED ISOLATION ROOF-CURB RAILS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. California Dynamics Corporation.
2. Kinetics Noise Control, Inc.
3. Novia; A Division of C&P.
4. Thybar Corporation.
5. Vibration Eliminator Co., Inc.
6. Vibration Management Corp.
7. Vibration Mountings & Controls, Inc.
8. Or approved equal.

B. Description: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment.

C. Upper Frame: Shall provide continuous and captive support for equipment.

D. Lower Support Assembly: Shall be formed sheet metal section containing adjustable and removable steel springs that support upper frame. Lower support assembly must have a means for attaching to building structure and a wood nailer for attaching roof materials and must be insulated with a minimum of 2 inches of rigid glass-fiber insulation on inside of assembly.

1. Adjustable, restrained-spring isolators must be mounted on elastomeric vibration isolation pads and must have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators must be located so they are accessible for adjustment at any time during the life of the installation without interfering with integrity of roof.
2. Minimum deflection as indicated on Drawings.

E. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and wind-load control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES.

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to wind-load forces.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength is adequate to carry static and wind force loads within specified loading limits.

3.4 INSTALLATION OF VIBRATION AND WIND-LOAD CONTROL DEVICES

A. Provide vibration and wind-load control devices for systems and equipment where indicated in Equipment Schedules or Vibration-Control Device Schedules on Drawings, where Specifications indicate they are to be installed on specific equipment and systems, and where required by applicable codes.

B. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

C. Installation of vibration isolators and wind-load restraints must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

D. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.

E. Equipment Restraints:

1. Install snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install wind-load-restraint devices using methods approved by an evaluation service member of ICC-ES that provides required submittals for component.

F. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 12 feet.

G. Install wind-load-restraint cables so they do not bend across edges of adjacent equipment or building structure.

H. Install wind-load-restraint devices using methods approved by an evaluation service member of ICC-ES that provides required submittals for component.

I. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

J. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

K. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

L. Post-Installed Concrete Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify commissioner if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge-Type Anchor Bolts: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors must be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.5 ACCOMMODATION OF DIFFERENTIAL MOTION

A. Provide flexible connections in piping systems where they cross structural joints and other point where differential movement may occur. Provide adequate flexibility to accommodate differential movement as determined in accordance with ASCE/SEI 7. Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties" for piping flexible connections.

3.6 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT BASES

A. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate dimensions of equipment bases with requirements of isolated equipment specified in this and other Sections. Where dimensions of base are indicated on Drawings, they may require adjustment to accommodate isolated equipment.

3.7 ADJUSTING

A. Adjust isolators after system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a qualified testing agency.
2. Schedule test with Commissioner, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Commissioner's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Commissioner.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

END OF SECTION 230548.13

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Warning tape.
4. Pipe labels.
5. Duct labels.
6. Valve tags.
7. Warning tags.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve-numbering scheme.

E. Valve Schedules: Provide for each piping system. Include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Brady Corporation.
    b. Brimar Industries, Inc.
    c. Carlton Industries, LP.
    d. Champion America.
    e. Craftmark Pipe Markers.
    f. emedco.
    g. Kolbi Pipe Marker Co.
    h. LEM Products Inc.
    i. Marking Services, Inc.
    j. Seton Identification Products; a Brady Corporation company.
    k. Or approved equal.

2. Material and Thickness: Brass, 0.032-inch minimum thickness, with predrilled or stamped holes for attachment hardware.
3. Letter and Background Color: As indicated for specific application under Part 3.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Brady Corporation.
    b. Brimar Industries, Inc.
    c. Carlton Industries, LP.
    d. Champion America.
    e. Craftmark Pipe Markers.
    f. emedco.
    g. Kolbi Pipe Marker Co.
    h. LEM Products Inc.
    i. Marking Services, Inc.
    j. Seton Identification Products; a Brady Corporation company.
    k. Or approved equal.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
3. Letter and Background Color: As indicated for specific application under Part 3.
4. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 WARNING SIGNS AND LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Carlton Industries, LP.
4. Champion America.
5. Craftmark Pipe Markers.
6. emedco.
7. LEM Products Inc.
8. Marking Services Inc.
9. National Marker Company.
10. Seton Identification Products; a Brady Corporation company.
11. Stranco, Inc.
12. Or approved equal.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-taping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Arc-Flash Warning Signs: Provide arc-flash warning signs in locations and with content in accordance with requirements of OSHA and NFPA70E.

J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 WARNING TAPE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Craftmark Pipe Markers.
4. National Marker Company.
5. Seton Identification Products; a Brady Corporation company.
6. Or approved equal.

B. Material: Vinyl.

C. Minimum Thickness: 0.005 inch.

D. Letter, Pattern, and Background Color: As indicated for specific application under Part 3.

E. Waterproof Adhesive Backing: Suitable for indoor or outdoor use.

F. Maximum Temperature: 160 deg F.

G. Minimum Width: 4 inches.

2.4 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Carlton Industries, LP.
5. Champion America.
6. Craftmark Pipe Markers.
7. emedco.
8. Kolbi Pipe Marker Co.
9. LEM Products Inc.
10. Marking Services Inc.
11. Seton Identification Products; a Brady Corporation company.
12. Or approved equal.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color coded, with lettering indicating service and showing flow direction in accordance with ASME A13.1.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

E. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

F. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings. Also include:

1. Pipe size.
2. Flow-Direction Arrows: Include flow-direction arrows on main distribution piping. Arrows may be either integral with label or applied separately.
3. Lettering Size: Size letters in accordance with ASME A13.1 for piping.

2.5 DUCT LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Carlton Industries, LP.
4. Champion America.
5. Craftmark Pipe Markers.
6. emedco.
7. Kolbi Pipe Marker Co.
8. LEM Products Inc.
9. Marking Services Inc.
10. Seton Identification Products; a Brady Corporation company.
11. Or approved equal.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings. Also include the following:

1. Duct size.
2. Flow-Direction Arrows: Include flow-direction arrows on main distribution ducts. Arrows may be either integral with label or may be applied separately.
3. Lettering Size: At least 1/2 inch for viewing distances of up to 72 inches and proportionately larger lettering for greater viewing distances.

2.6 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Carlton Industries, LP.
5. Champion America.
6. Craftmark Pipe Markers.
7. emedco.
8. Kolbi Pipe Marker Co.
9. LEM Products Inc.
10. Marking Services Inc.
11. Seton Identification Products; a Brady Corporation company.
12. Or approved equal.

B. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.04-inch minimum thickness, with predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass link chain or S-hook.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

2.7 WARNING TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Champion America.
4. Craftmark Pipe Markers.
5. emedco.
6. Kolbi Pipe Marker Co.
7. LEM Products Inc.
8. Marking Services Inc.
9. Seton Identification Products; a Brady Corporation company.
10. Or approved equal.

B. Description: Preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches.
2. Fasteners: Brass grommet and wire .
3. Nomenclature: Large-size primary caption, such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Letter and Background Color: As indicated for specific application under Part 3.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.3 INSTALLATION, GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.4 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of mechanical equipment.

B. Sign and Label Colors:

1. White letters on an ANSI Z535.1 safety-blue background.

C. Locate equipment labels where accessible and visible.

D. Arc-Flash Warning Signs: Provide arc-flash warning signs on electrical disconnects and other equipment where arc-flash hazard exists, as indicated on Drawings, and in accordance with requirements of OSHA and NFPA 70E.

3.5 INSTALLATION OF WARNING TAPE

A. Warning Tape Color and Pattern: Yellow background with black diagonal stripes.

B. Install warning tape on pipes and ducts, with cross-designated walkways providing less than 6 ft. of clearance.

C. Locate tape so as to be readily visible from the point of normal approach.

3.6 INSTALLATION OF PIPE LABELS

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Install pipe labels showing service and flow direction with permanent adhesive on pipes.

C. Stenciled Pipe Label Option: Stenciled labels showing service and flow direction may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

D. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. of each valve and control device.
2. At access doors, manholes, and similar access points that permit view of concealed piping.
3. Within 3 ft. of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 25 ft. along each run. Reduce intervals to 10 ft. in areas of congested piping, ductwork, and equipment.

E. Do not apply plastic pipe labels or plastic tapes directly to bare pipes conveying fluids at temperatures of 125 deg F or higher. Where these pipes are to remain uninsulated, use a short section of insulation or use stenciled labels.

F. Flow-Direction Arrows: Use arrows to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

G. Pipe-Label Color Schedule:

1. Heating Water Piping: White letters on an ANSI Z535.1 safety-green background.
2. Refrigerant Piping: White letters on an ANSI Z535.1 safety-blue background.
3. Flammable Fluids: Black letters on an ANSI Z535.1 safety-yellow background.
4. Combustible Fluids: White letters on an ANSI Z535.1 safety-brown background.
5. Potable and Other Water: White letters on an ANSI Z535.1 safety-green background.
6. Compressed Air: White letters on an ANSI Z535.1 safety-blue background.

3.7 INSTALLATION OF DUCT LABELS

A. Install plastic-laminated duct labels showing service and flow direction with permanent adhesive on air ducts.

1. Provide labels in the following color codes:

a. For air supply ducts: White letters on blue background.
b. For air return ducts: White letters on blue background**.**
c. For exhaust-, outside-, relief-, return-, and mixed-air ducts: White letters on blue background.

B. Stenciled Duct-Label Option: Stenciled labels showing service and flow direction may be provided instead of plastic-laminated duct labels, at Installer's option.

1. For all air ducts: Black letters on white background.

C. Locate label near each point where ducts enter into and exit from concealed spaces and at maximum intervals of 20 ft. where exposed or are concealed by removable ceiling system.

D. Stenciled Access Panels and Door Labels, Equipment Labels, and Similar Operational Instructions:

1. Black letters on White background.

3.8 INSTALLATION OF VALVE TAGS

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule in the operating and maintenance manual.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below.

1. Valve-Tag Size and Shape:

a. Refrigerant: 1-1/2 inches, round.
b. Hot Water: 1-1/2 inches, round.
c. Gas: 1-1/2 inches, round.

2. Valve-Tag Colors:

   a. For each piping system, use the same lettering and background coloring system on valve tags as used for the Pipe Label Schedule text and background.

3.9 INSTALLATION OF WARNING TAGS

A. Warning Tag Color: Black letters on an ANSI Z535.1 safety-yellow background.

B. Attach warning tags, with proper message, to equipment and other items where indicated on Drawings.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:
    a. Variable-air-volume systems.
    b. Multizone systems.
2. Balancing Hydronic Piping Systems:
    a. Variable-flow hydronic systems.
3. Balancing steam systems.
4. Testing, Adjusting, and Balancing Equipment:
    a. Motors.
    b. Boilers.
5. Testing, adjusting, and balancing existing systems and equipment.
6. Sound tests.
7. Vibration tests.
8. Duct leakage tests.
9. Control system verification.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

A. TAB Conference: If requested by the Commissioner conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Needs for coordination and cooperation of trades and subcontractors.
d. Proposed procedures for documentation and communication flow.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Sustainable Design Submittals:

1. Air-Balance Report: Documentation indicating that Work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. HVAC Flush Report: Documentation indicating that building HVAC system flush complies with Green Globes Section 3.2.4.4"IAQ During Construction."

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit TAB specialist Qualifications within 30 days from start of the work.

B. Contract Documents Examination Report: Submit TAB specialist Qualifications within 30 days from start of the work.

C. Strategies and Procedures Plan: Submit TAB strategies and step-by-step procedures as specified in "Preparation" Article, within 30 days from start of the work.

D. System Readiness Checklists: Within 30 days from start of the work.

E. Examination Report: Submit a summary report of the examination review required in "Examination" Article within 30 days from start of the work.

F. Certified TAB reports.

G. Sample report forms.

H. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. TAB Specialists Qualifications: Certified by AABC.

C. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

D. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.9 FIELD CONDITIONS

A. Full City of New York Occupancy: City of New York will occupy the site and existing building during entire TAB period. Cooperate with City of New York during TAB operations to minimize conflicts with City of New York's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.

P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

2. Hydronics:

a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
b. Piping is complete with terminals installed.
c. Water treatment is complete.
d. Systems are flushed, filled, and air purged.
e. Strainers are pulled and cleaned.
f. Control valves are functioning per the sequence of operation.
g. Shutoff and balance valves have been verified to be 100 percent open.
h. Pumps are started and proper rotation is verified.
i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
j. Variable-frequency controllers' startup is complete and safeties are verified.
k. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:

    a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
    b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
    c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
    d. Adjust controls so that terminal is calling for minimum airflow.
    e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
    f. When in full cooling or full heating, ensure that there is no mixing of hot-deck and cold-deck airstreams unless so designed.
    g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
    c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

6. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report any artificial loading of filters at the time static pressures are measured.

7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
    b. Verify that terminal units are meeting design airflow under system maximum flow.

8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls sub-contractor.
9. Verify final system conditions as follows:

    a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
    b. Re-measure and confirm that total airflow is within design.
    c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
    d. Mark final settings.
    e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
    f. Verify tracking between supply and return fans.

3.7 PROCEDURES FOR MULTIZONE SYSTEMS

A. Position the unit's automatic zone dampers for maximum flow through the cooling coil.

B. The procedures for multizone systems will utilize the zone balancing dampers to achieve the indicated airflow within the zone.

C. After balancing, place the unit's automatic zone dampers for maximum heating flow. Retest zone airflows and record any variances.

D. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Set outside-air, return-air and relief-air dampers for proper position that simulates minimum outdoor air conditions.
    b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.

c. Measure static pressure across each component that makes up the air-handling system.
d. Report artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from Commissioner for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

E. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

F. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

G. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.8 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and heat exchanger flow rates with pump design flow rate.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:

1. Check liquid level in expansion tank.
2. Check highest vent for adequate pressure.
3. Check flow-control valves for proper position.
4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
5. Verify that motor starters are equipped with properly sized thermal protection.
6. Check that air has been purged from the system.

3.9 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals, and proceed as specified above for hydronic systems.

B. Adjust the variable-flow hydronic system as follows:

1. Verify that the differential-pressure sensor is located as indicated.
2. Determine whether there is diversity in the system.

C. For systems with no diversity:

1. Adjust pumps to deliver total design gpm.

    a. Measure total water flow.

        1) Position valves for full flow through coils.
        2) Measure flow by main flow meter, if installed.
        3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

    b. Measure pump TDH as follows:

        1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
        2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
        3) Convert pressure to head and correct for differences in gage heights.
        4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
        5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

    c. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

2. Adjust flow-measuring devices installed in mains and branches to design water flows.

    a. Measure flow in main and branch pipes.
    b. Adjust main and branch balance valves for design flow.

c. Re-measure each main and branch after all have been adjusted.

3. Adjust flow-measuring devices installed at terminals for each space to design water flows.

   a. Measure flow at terminals.
   b. Adjust each terminal to design flow.
   c. Re-measure each terminal after it is adjusted.
   d. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
   e. Perform temperature tests after flows have been balanced.

4. For systems with pressure-independent valves at terminals:

   a. Measure differential pressure and verify that it is within manufacturer's specified range.
   b. Perform temperature tests after flows have been verified.

5. For systems without pressure-independent valves or flow-measuring devices at terminals:

   a. Measure and balance coils by either coil pressure drop or temperature method.
   b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

6. Prior to verifying final system conditions, determine the system differential-pressure set point.
7. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.
8. Mark final settings and verify that all memory stops have been set.
9. Verify final system conditions as follows:

   a. Re-measure and confirm that total water flow is within design.
   b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
   c. Mark final settings.

10. Verify that memory stops have been set.

D. For systems with diversity:

1. Determine diversity factor.
2. Simulate system diversity by closing required number of control valves, as approved by the Commissioner.
3. Adjust pumps to deliver total design gpm.

   a. Measure total water flow.

      1) Position valves for full flow through coils.
      2) Measure flow by main flow meter, if installed.
      3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

   b. Measure pump TDH as follows:

1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
3) Convert pressure to head and correct for differences in gage heights.
4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

c. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

4. Adjust flow-measuring devices installed in mains and branches to design water flows.

a. Measure flow in main and branch pipes.
b. Adjust main and branch balance valves for design flow.
c. Re-measure each main and branch after all have been adjusted.

5. Adjust flow-measuring devices installed at terminals for each space to design water flows.

a. Measure flow at terminals.
b. Adjust each terminal to design flow.
c. Re-measure each terminal after it is adjusted.
d. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
e. Perform temperature tests after flows have been balanced.

6. For systems with pressure-independent valves at terminals:

a. Measure differential pressure, and verify that it is within manufacturer's specified range.
b. Perform temperature tests after flows have been verified.

7. For systems without pressure-independent valves or flow-measuring devices at terminals:

a. Measure and balance coils by either coil pressure drop or temperature method.
b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

8. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance terminals that were just opened.
9. Prior to verifying final system conditions, determine system differential-pressure set point.
10. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.
11. Mark final settings and verify that memory stops have been set.
12. Verify final system conditions as follows:

a. Re-measure and confirm that total water flow is within design.
b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.

c. Mark final settings.

13. Verify that memory stops have been set.

3.10 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.11 PROCEDURES FOR BOILERS

A. Hydronic Boilers:

1. Measure and record entering- and leaving-water temperatures.
2. Measure and record water flow.
3. Record relief valve pressure setting.

3.12 SOUND TESTS

A. After the systems are balanced and project is at Substantial Completion, measure and record sound levels at 5 locations as designated by the Commissioner.

B. Instrumentation:

1. The sound-testing meter must be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
2. The sound-testing meter must be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
4. The accuracy of the sound-testing meter must be plus or minus one decibel.

C. Test Procedures:

1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.
2. Equipment should be operating at design values.

3. Calibrate the sound-testing meter prior to taking measurements.
4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment off.
6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment operating.
7. Take readings no closer than 36 inches from a wall or from the operating equipment and approximately 60 inches from the floor, with the meter held or mounted on a tripod.
8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.

D. Reporting:

1. Report must record the following:

   a. Location.
   b. System tested.
   c. dBA reading.
   d. Sound pressure level in each octave band with equipment on and off.

2. Plot sound pressure levels on NC worksheet with equipment on and off.

3.13 VIBRATION TESTS

A. After systems are balanced and construction is Substantially Complete, measure and record vibration levels on equipment having motor horsepower equal to or greater than 10.

B. Instrumentation:

1. Use portable, battery-operated, and microprocessor-controlled vibration meter with or without a built-in printer.
2. The meter must automatically identify engineering units, filter bandwidth, amplitude, and frequency scale values.
3. The meter must be able to measure machine vibration displacement in mils of deflection, velocity in inches per second, and acceleration in inches per second squared.
4. Verify calibration date is current for vibration meter before taking readings.

C. Test Procedures:

1. To ensure accurate readings, verify that accelerometer has a clean, flat surface and is mounted properly.
2. With the unit running, set up vibration meter in a safe, secure location. Connect transducer to meter with proper cables. Hold magnetic tip of transducer on top of the bearing, and measure unit in mils of deflection. Record measurement, then move transducer to the side of the bearing and record in mils of deflection. Record an axial reading in mils of deflection by holding nonmagnetic, pointed transducer tip on end of shaft.
3. Change vibration meter to velocity (inches per second) measurements. Repeat and record above measurements.

4. Record CPM or rpm.
5. Read each bearing on motor, fan, and pump as required. Track and record vibration levels from rotating component through casing to base.

D. Reporting:

1. Report must record location and the system tested.
2. Include horizontal-vertical-axial measurements for tests.
3. Verify that vibration limits follow Specifications, or, if not specified, follow the General Machinery Vibration Severity Chart or Vibration Acceleration General Severity Chart from the AABC National Standards. Acceptable levels of vibration are normally "smooth" to "good."
4. Include in report General Machinery Vibration Severity Chart, with conditions plotted.

3.14 DUCT LEAKAGE TESTS

A. Witness the duct pressure testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified tolerances.

C. Report deficiencies observed.

3.15 CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify temperature control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of lockout or interlock systems.
6. Verify the operation of valve and damper actuators.
7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.16 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed must have priority over the tolerances specified above.

3.17 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.18 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Contractor's name and address.
6. Report date.
7. Signature of TAB supervisor who certifies the report.
8. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
9. Summary of contents including the following:

a. Indicated versus final performance.
b. Notable characteristics of systems.
c. Description of system operation sequence if it varies from the Contract Documents.

10. Nomenclature sheets for each item of equipment.
11. Data for terminal units, including manufacturer's name, type, size, and fittings.
12. Notes to explain why certain final data in the body of reports vary from indicated values.
13. Test conditions for fans and pump performance forms including the following:

a. Settings for outdoor-, return-, and exhaust-air dampers.
b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches, and bore.
i. Center-to-center dimensions of sheave and amount of adjustments in inches.
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.

c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Preheat-coil static-pressure differential in inches wg.
g. Cooling-coil static-pressure differential in inches wg.
h. Heating-coil static-pressure differential in inches wg.
i. Outdoor airflow in cfm.
j. Return airflow in cfm.
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft..
h. Tube size in NPS.
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Average face velocity in fpm.
c. Air pressure drop in inches wg.
d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
e. Return-air, wet- and dry-bulb temperatures in deg F.
f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.

l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.
o. Inlet steam pressure in psig.

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h.
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches, and bore.
n. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Air temperature differential in deg F.
e. Entering-air static pressure in inches wg.
f. Leaving-air static pressure in inches wg.
g. Air static-pressure differential in inches wg.
h. Low-fire fuel input in Btu/h.
i. High-fire fuel input in Btu/h.
j. Manifold pressure in psig.
k. High-temperature-limit setting in deg F.
l. Operating set point in Btu/h.
m. Motor voltage at each connection.
n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h.

H. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.

c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Airflow rate in cfm.
i. Face area in sq. ft..
j. Minimum face velocity in fpm.

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h.
b. Airflow rate in cfm.
c. Air velocity in fpm.
d. Entering-air temperature in deg F.
e. Leaving-air temperature in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

I. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

K. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.

e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.

M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

N. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.19 VERIFICATION OF TAB REPORT

A. TAB specialist must conduct the inspection in the presence of Commissioner.

B. Commissioner will randomly select measurements, documented in the final report, to be rechecked. Rechecking must be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements will be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing must be considered incomplete and will be rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists must recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.

F. Prepare test and inspection reports.

3.20 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
7. Outdoor, concealed supply and return.
8. Outdoor, exposed supply and return.

B. Related Requirements:

1. Section 230716 "HVAC Equipment Insulation."
2. Section 230719 "HVAC Piping Insulation."
3. Section 233113 "Metal Ducts" for duct liners.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For coatings, indicating VOC content.

4. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
5. Product Data: For sealants, indicating VOC content.
6. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Sheet Form Insulation Materials: 12 inches square.
2. Sheet Jacket Materials: 12 inches square.
3. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.5 INFORMATIONAL SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers are to be marked with the manufacturer's name, appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.8 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a qualified testing agency. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. All Insulation Installed Indoors; Outdoors-Installed Insulation in Contact with Airstream: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
3. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials are to be applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534, Type II for sheet materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Aeroflex USA.
    b. Armacell LLC.
    c. K-Flex USA.
    d. Or approved equal.

G. Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 450 deg F in accordance with ASTM C411. Comply with ASTM C553, Type II, and ASTM C1290, Type II with factory-applied vinyl jacketType III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Manson Insulation Inc.
    e. Owens Corning.
    f. Or approved equal.

H. High-Temperature, Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin, unfaced; suitable for maximum use temperature up to 1000 deg F. Comply with ASTM C553, Type V.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Manson Insulation Inc.
    e. Owens Corning.
    f. Or approved equal.

I. Mineral Wool Blanket: Basalt volcanic rock-derived fibers bonded with a thermosetting resin, unfaced; suitable for maximum use temperature up to 1200 deg F in accordance with ASTM C447. Comply with ASTM C553.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Owens Corning.
    c. ROCKWOOL Technical Insulation.
    d. Or approved equal.

J. Glass-Fiber Board Insulation: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 250 deg F for jacketed and between 35 deg F and 450 deg F for unfaced in accordance with ASTM C411. Comply with ASTM C612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Manson Insulation Inc.
    e. Owens Corning.
    f. Or approved equal.

K. High-Temperature, Glass-Fiber Board: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 1000 deg F in accordance with ASTM C411. Comply with ASTM C612, Type III, unfaced.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Manson Insulation Inc.
    e. Owens Corning.
    f. Or approved equal.

L. Mineral Wool Board: Basalt volcanic rock-derived fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 1100 deg F in accordance with ASTM C411. Comply with ASTM C612, Type III, unfaced.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Owens Corning.
    c. ROCKWOOL Technical Insulation.
    d. Or approved equal.

M. Glass-Fiber, Pipe and Tank: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 850 deg F, in accordance with ASTM C411. Comply with ASTM C1393.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Manson Insulation Inc.
    e. Owens Corning.
    f. Or approved equal.

2. Semirigid board material with factory-applied ASJ jacket.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

N. Mineral Wool, Pipe and Tank: Mineral wool fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 1000 deg F, in accordance with ASTM C411. Comply with ASTM C1393.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. Owens Corning.
   c. Rockwool International.
   d. Or approved equal.

2. Semirigid board material with factory-applied ASJ jacket.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

O. Polyolefin: Polyethylene thermal plastic insulation. Comply with ASTM C1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Armacell LLC.
   b. Nomaco.
   c. Johns Manville
   d. Or approved equal.

2.3 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F. Comply with ASTM C656, Type II, Grade 6. Tested and certified to provide a 2-hour fire rating by an NRTL acceptable to 2014 NYC Building Codes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. 3M.
   c. Thermal Ceramics.
   d. Or approved equal.

B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by a qualified NRTL.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. 3M.
   b. Thermal Ceramics.
   c. Unifrax Corporation.
   d. Or approved equal.

2.4 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Aeroflex USA.
b. Armacell LLC.
c. Childers Brand; H. B. Fuller Construction Products.
d. Foster Brand; H. B. Fuller Construction Products.
e. K-Flex USA.
f. Or approved equal.

2. Adhesives must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.
e. Or approved equal.

2. Fiberglass adhesive must have a VOC content of 80 g/L or less when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.
e. Or approved equal.

2. Adhesive must have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Dow Consumer Solutions.
   b. Johns Manville; a Berkshire Hathaway company.
   c. P.I.C. Plastics, Inc.
   d. Proto Corporation.
   e. Speedline Corporation.
   f. Or approved equal.

2. Adhesive must have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

1. VOC Content: 300 g/L or less.
2. Low-Emitting Materials: Mastic coatings must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Knauf Insulation.
   d. Vimasco Corporation.
   e. Or approved equal.

2. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Comply with MIL-PRF-19565C, Type II, for permeance requirements, with supplier listing on DOD QPD - Qualified Products Database.
5. Color: White.

C. Vapor-Retarder Mastic, Solvent Based, Exterior Use: Suitable for outdoor use on below ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. Or approved equal.

2. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Color: White.

2.6 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and are compatible with insulation materials, jackets, and substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Vimasco Corporation.
   d. Or approved equal.

2. Adhesives must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
5. Service Temperature Range: 0 to plus 180 deg F.
6. Color: White.

2.7 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. Mon-Eco Industries, Inc.
   e. Or approved equal.

2. Materials are compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. Sealant must have a VOC content of 420 g/L or less.
7. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. Or approved equal.

2. Materials are compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. Sealant must have a VOC content of 420 g/L or less.
7. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.8 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.
3. ASJ+: All-service jacket composed of aluminum foil reinforced with glass scrim bonded to a kraft paper interleaving with an outer film leaving no paper exposed; complying with ASTM C1136, Types I, II, III, IV, and VII.
4. PSK Jacket: Aluminum foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C1136, Type II.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. P.I.C. Plastics, Inc.
   c. Proto Corporation.
   d. Speedline Corporation.
   e. Or approved equal.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.

D. Metal Jacket:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. Proto Corporation.
   c. RPR Products, Inc.
   d. Or approved equal.

2. Aluminum Jacket: Comply with ASTM B209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

   a. Sheet and roll stock ready for shop or field sizing.
   b. Finish and thickness are indicated in field-applied jacket schedules.
   c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
   d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.

3. Stainless-Steel Jacket: ASTM A240/A240M.

   a. Sheet and roll stock ready for shop or field sizing.
   b. Material, finish, and thickness are indicated in field-applied jacket schedules.
   c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
   d. Moisture Barrier for Outdoor Applications: 3-mil- thick polysurlyn.

E. Self-Adhesive Outdoor Jacket (Asphaltic): 60-mil- thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with whitestucco-embossed aluminum-foil facing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. MFM Building Products Corp.

b. 3M.
c. Polyguard Products, Inc.
d. Or approved equal.

F. Self-Adhesive Indoor/Outdoor Jacket (Non-Asphaltic): Vapor barrier and waterproofing jacket for installation over insulation located aboveground outdoors or indoors. Specialized jacket has five layers of laminated aluminum and polyester film with low-temperature acrylic pressure-sensitive adhesive. Outer aluminum surface is coated with UV-resistant coating for protection from environmental contaminants.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M.
b. Foster Brand; H. B. Fuller Construction Products.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Or approved equal.

2. Permeance: 0.00 perm as tested in accordance with ASTM F1249.
3. Flamespread/Smoke Developed: 25/50 as tested in accordance with ASTM E84.
4. Aluminum Finish: EmbossedSmooth.

2.10 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Mesh: Approximately 6 oz./sq. yd. with a thread count of 5 strands by 5 strands/sq. in. for covering ducts.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Vimasco Corporation.
d. Or approved equal.

B. Woven Polyester Mesh: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Vimasco Corporation.
d. Or approved equal.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Avery Dennison Corporation, Specialty Tapes Division.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Or approved equal.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Avery Dennison Corporation, Specialty Tapes Division.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Or approved equal.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Ideal Tape Co., Inc., an American Biltrite Company.
c. Knauf Insulation.
d. Or approved equal.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. 3M Industrial Adhesives and Tapes Division.
    b. Avery Dennison Corporation, Specialty Tapes Division.
    c. Ideal Tape Co., Inc., an American Biltrite Company.
    d. Knauf Insulation.
    e. Or approved equal.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.12 SECUREMENTS

A. Bands:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. 3M.
    c. RPR Products, Inc.
    d. Or approved equal.

2. Stainless Steel: ASTM A240/A240M, Type 304Type 316; 0.015 inch thick, 1/2 inch3/4 inch wide with wing sealclosed seal.
3. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch3/4 inch wide with wing sealclosed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) Gemco.
        3) Midwest Fasteners, Inc.
        4) Nelson Stud Welding.
        5) Or approved equal.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) CL WARD & Family Inc.
        3) Gemco.
        4) Midwest Fasteners, Inc.
        5) Nelson Stud Welding.
        6) Or approved equal.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) Gemco.
        3) Midwest Fasteners, Inc.
        4) Or approved equal.

    b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
    c. Spindle: Copper- or zinc-coated, low-carbon steelStainless steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
    d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) Gemco.
        3) Midwest Fasteners, Inc.
        4) Or approved equal.

    b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
    c. Spindle: Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
    d. Adhesive-backed base with a peel-off protective cover.

5. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steelaluminumstainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) Gemco.
        3) Midwest Fasteners, Inc.
        4) Nelson Stud Welding.
        5) Or approved equal.

    b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

6. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Gemco.
        2) AGM Industries, Inc.
        3) Midwest Fasteners, Inc.
        4) Or approved equal.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.080-inch nickel-copper alloy0.062-inch soft-annealed, stainless steel0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. C & F Wire.
    b. Johns Manville; a Berkshire Hathaway company.
    c. RPR Products, Inc.
    d. Or approved equal.

2.13 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC in accordance with ASTM D1784, Class 16354-C. White or color-coded to match adjacent surface.

B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum in accordance with ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

C. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel in accordance with ASTM A167 or ASTM A240/A240M, Type 304.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket .

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents, unless otherwise approved by the Commissioner.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.5 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.

4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

E. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC AND POLYOLEFIN INSULATION

A. Comply with manufacturer's written installation instructions and ASTM C1710.

B. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Square and Rectangular Ducts and Plenums:

1. Provide 1/4 inch more per side for a tight, compression fit.
2. Cut sheet insulation with the following dimensions:

   a. Width of duct plus 1/4 inch, one piece.
   b. Height of duct plus 1/4 inch, plus thickness of insulation, two pieces.
   c. Width of duct plus 1/4 inch, plus two times the thickness of insulation, one piece.

3. Insulate the bottom of the duct with the sheet from (a) above, then the sides with the two sheets from (b) above, and finally the top of the duct with the sheet from (c) above.
4. Insulation without self-adhering backing:

a. Apply 100 percent coverage of manufacturer adhesive on the metal surface, then the insulation, except for the last 1/4 inch where sheets will butt together.
b. Roll sheet down into position.
c. Press two sheets together under compression and apply adhesive at the butt joint to seal the two sheets together.

5. Insulation with self-adhering backing:

a. Peel back release paper in 6- to 8-inch increments and line up sheet.
b. Press firmly to activate adhesive.
c. Align material and continue to line up correctly, pressing firmly while slowly removing release paper.
d. Allow 1/4-inch overlap for compression at butt joints.
e. Apply adhesive at the butt joint to seal the two sheets together.

6. Insulate duct brackets following manufacturer's written installation instructions.

D. Circular Ducts:

1. Determine the circumference of the duct, using a strip of insulation the same thickness as to be used.
2. Cut the sheet to the required size.
3. Apply 100 percent coverage of manufacturer adhesive on the metal surface then the insulation.
4. Apply manufacturer adhesive to the cut surfaces along 100 percent of the longitudinal seam. Press together the seam at the ends and then the middle. Close the entire seam starting from the middle.

3.7 INSTALLATION OF GLASS-FIBER AND MINERAL-WOOL INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

B. Comply with manufacturer's written installation instructions.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not overcompress insulation during installation.
e. Impale insulation over pins and attach speed washers.
f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

C. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.9 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Comply with manufacturer's written installation instructions.

B. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

C. Insulate duct access panels and doors to achieve same fire rating as duct.

D. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.10 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Commissioner. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection is limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.12 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.

7. Outdoor, concealed supply and return.
8. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.13 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round and flat-oval, supply-air duct insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
2. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.

B. Concealed, round and flat-oval, return-air duct insulation is one of the following:

1. Glass-Fiber Blanket: 3 inches thick and 3 lb/cu. ft.nominal density.
2. Mineral Wool Blanket: 1-1/2 inches thick and 6 lb/cu. ft. nominal density.

C. Concealed, round and flat-oval, outdoor-air duct insulation is one of the following:

1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
2. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.

D. Concealed, round and flat-oval, exhaust-air duct insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.

E. Concealed, rectangular, supply-air duct insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

F. Concealed, rectangular, return-air duct insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

G. Concealed, rectangular, outdoor-air duct insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

H. Concealed, rectangular, exhaust-air duct insulation between isolation damper and penetration of building exterior is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

I. Concealed, supply-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

J. Concealed, return-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

K. Concealed, outdoor-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

L. Concealed, exhaust-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

M. Exposed, supply-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

N. Exposed, return-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

O. Exposed, outdoor-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

P. Exposed, exhaust-air plenum insulation is one of the following:

1. Glass-Fiber Blanket: 2 inches thick and 3 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
3. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
4. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

3.14 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.

B. Concealed, rectangular, supply-air duct insulation is one of the following:

1. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
2. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

C. Concealed, rectangular, return-air duct insulation is one of the following:

1. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
2. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

D. Concealed, supply-air plenum insulation is one of the following:

1. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
2. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

E. Concealed, return-air plenum insulation is one of the following:

1. Mineral Wool Blanket: 2 inches thick and 6 lb/cu. ft. nominal density.
2. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

F. Exposed, supply-air plenum insulation is one of the following:

1. Mineral Wool Board: 3 inches thick and 6 lb/cu. ft. nominal density.

G. Exposed, return-air plenum insulation is one of the following:

1. Mineral Wool Board: 3 inches thick and 6 lb/cu. ft. nominal density.

3.15 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:

1. None.

D. Ducts and Plenums, Exposed:

1. PVC: 20 mils thick.

3.16 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:

1. Aluminum, Smooth: 0.020 inch thick.

D. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:

1. Aluminum, Smooth: 0.020 inch thick.

E. Ducts and Plenums, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches:

1. Aluminum, Smooth with 4-by-1-Inch Box Ribs: 0.040 inch thick.

END OF SECTION 230713

SECTION 230716 - HVAC EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes insulating HVAC equipment that is not factory insulated.

B. Related Sections:

1. Section 230713 "Duct Insulation."
2. Section 230719 "HVAC Piping Insulation."

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail removable insulation at equipment connections.
2. Detail application of field-applied jackets.
3. Detail application at linkages of control devices.
4. Detail field application for each equipment type.

D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Sheet Form Insulation Materials: 12 inches square.
2. Sheet Jacket Materials: 12 inches square.

3. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.5 INFORMATIONAL SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include, the name of the manufacturer, fabricator, type, description, and size, as well as ASTM standard designation, and maximum use temperature.

1.8 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with equipment Installer for equipment insulation application.

C. Coordinate installation and testing of heat tracing.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a qualified testing agency. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. All Insulation Installed Indoors; Outdoors-Installed Insulation in Contact with Airstream: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
3. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Breeching Insulation Schedule," "Indoor Equipment Insulation Schedule," and "Outdoor, Aboveground Equipment Insulation Schedule" articles for where insulating materials are applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534/C534M, Type II for sheet materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Aeroflex USA.
    b. Armacell LLC.
    c. K-Flex USA.
    d. Or approved equal.

G. Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 450 deg F in accordance with ASTM C411. Comply with ASTM C553, Type II, and ASTM C1290, Type III, with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Manson Insulation Inc.
    e. Owens Corning.
    f. Or approved equal.

H. Glass-Fiber Board: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 250 deg F for jacketed and between 35 deg F and 450 deg F for unfaced in accordance with ASTM C411. Comply with ASTM C612, Type IA or Type IB. Provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation; Saint-Gobain North America.
b. Johns Manville; a Berkshire Hathaway company.
c. Knauf Insulation.
d. Manson Insulation Inc.
e. Owens Corning.
f. Or approved equal.

2.3 INSULATING CEMENTS

A. Glass-Fiber and Mineral Wool Insulating Cement: Comply with ASTM C195.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Carlisle
c. Duct Mate
d. Duro Dyne
e. Foster Brand; H. B. Fuller Construction Products.
f. Or approved equal.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C196.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Carlisle
c. Duct Mate
d. Duro Dyne
e. Foster Brand; H. B. Fuller Construction Products.
f. Or approved equal.

C. Glass-Fiber and Mineral Wool, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. |Childers Brand; H. B. Fuller Construction Products.
b. Carlisle
c. Duct Mate
d. Duro Dyne

e. Foster Brand; H. B. Fuller Construction Products.
f. Or approved equal.

2.4 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Carlisle
c. Duct Mate
d. Duro Dyne
e. Foster Brand; H. B. Fuller Construction Products.
f. Or approved equal.

2. Adhesive: As recommended by cellular glass manufacturer and with a VOC content of 80 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Flexible Elastomeric and Polyolefin Adhesive: Solvent-based adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Aeroflex USA.
b. Armacell LLC.
c. K-Flex USA.
d. Or approved equal.

2. Adhesives must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Flame-spread index is 25 or less and smoke-developed index is 50 or less as tested in accordance with ASTM E84.
5. Wet Flash Point: Below 0 deg F
6. Service Temperature Range: 40 to 200 deg F.
7. Color: Black.

D. ASJ Adhesive and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Mon-Eco Industries, Inc.
d. Or approved equal.

2. Adhesives must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. P.I.C. Plastics, Inc.
c. Proto Corporation.
d. Speedline Corporation.
e. The Dow Chemical Company.
f. Or approved equal.

2. Adhesive: As recommended by Adhesive - PVC Jacket manufacturer and with a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

1. Mastics: As recommended by insulation manufacturer and with a VOC content of 50 g/L or less.
2. Mastics must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Vapor-Retarder Mastic, Solvent Based, Outdoor Use: Suitable for outdoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Mon-Eco Industries, Inc.
d. Or approved equal.

2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Color: White.

2.6 LAGGING ADHESIVES

A. Adhesives comply with MIL-A-3316C, Class I, Grade A and are compatible with insulation materials, jackets, and substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Vimasco Corporation.
d. Or approved equal.

2. Adhesive must be as recommended by insulation manufacturer and must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment insulation.
5. Service Temperature Range: 20 to plus 180 deg F.
6. Color: White.

2.7 SEALANTS

A. Materials are as recommended by the insulation manufacturer and are compatible with insulation materials, jackets, and substrates.

B. Joint Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Mon-Eco Industries, Inc.
d. Owens Corning.
e. Or approved equal.

2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 58 to plus 176 deg F.
4. Color: White or gray.
5. Sealant must have a VOC content of 420 g/L or less.
6. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Duro Dyne.
d. Or approved equal.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.
5. Sealant must have a VOC content of 420 g/L or less.
6. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. ASJ Flashing Sealants and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Duro Dyne.
d. Or approved equal.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. Sealant must have a VOC content of 420 g/L or less.
6. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.8 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C1136, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. P.I.C. Plastics, Inc.
    c. Proto Corporation.
    d. Speedline Corporation.
    e. Or approved equal.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: Color-code jackets based on system. Color as selected by Commissioner.
4. Factory-fabricated tank heads and tank side panels.

D. Metal Jacket:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. 3M.

    b. Johns Manville; a Berkshire Hathaway company.
    c. RPR Products, Inc.
    d. Or approved equal.

2. Aluminum Jacket: Comply with ASTM B209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

    a. Sheet and roll stock ready for shop or field sizing.
    b. Finish and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
    d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
    e. Factory-Fabricated Fitting Covers:

        1) Same material, finish, and thickness as jacket.
        2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.
        5) End caps.
        6) Beveled collars.
        7) Valve covers.
        8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

3. Stainless Steel Jacket: ASTM A240/A240M.

    a. Sheet and roll stock ready for shop or field sizing.
    b. Material, finish, and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
    d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.

e. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.
2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

E. Self-Adhesive Outdoor Jacket (Asphaltic): 60-mil- thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a cross-laminated polyethylene film covered with white aluminum-foil facing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M.

b. MFM Building Products Corp.
c. Polyguard Products, Inc.
d. Or approved equal.

F. Self-Adhesive Indoor/Outdoor Jacket (Non-Asphaltic): Vapor barrier and waterproofing jacket for installation over insulation located aboveground outdoors or indoors. Specialized jacket has five layers of laminated aluminum and polyester film with low-temperature acrylic pressure-sensitive adhesive. Outer aluminum surface is coated with UV-resistant coating for protection from environmental contaminants.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M.
b. Foster Brand; H. B. Fuller Construction Products.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Or approved equal.

2. Permeance: 0.00 perm as tested in accordance with ASTM F1249.
3. Flamespread/Smoke Developed: 25/50 as tested in accordance with ASTM E84.
4. Aluminum Finish: Embossed.

G. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm when tested in accordance with ASTM E96/E96M and with a flame-spread index of 10 and a smoke-developed index of 20 when tested in accordance with ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. 3M.
c. Knauf Insulation.
d. Or approved equal.

H. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm when tested in accordance with ASTM E96/E96M and with a flame-spread index of 25 and a smoke-developed index of 50 when tested in accordance with ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. 3M.
   c. Knauf Insulation.
   d. Or approved equal.

2.10 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. 3M Industrial Adhesives and Tapes Division.
   b. Avery Dennison Corporation, Specialty Tapes Division.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
   e. Or approved equal.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. 3M Industrial Adhesives and Tapes Division.
   b. Avery Dennison Corporation, Specialty Tapes Division.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
   e. Or approved equal.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. 3M Industrial Adhesives and Tapes Division.
   b. Ideal Tape Co., Inc., an American Biltrite Company.
   c. Knauf Insulation.
   d. Or approved equal.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. 3M Industrial Adhesives and Tapes Division.
   b. Avery Dennison Corporation, Specialty Tapes Division.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
   e. Or approved equal.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.11 SECUREMENTS

A. Bands:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. 3M.
   c. RPR Products, Inc.
   d. Or approved equal.

2. Stainless Steel: ASTM A240/A240M, Type 316; 0.015 inch thick, 3/4 inch wide with closed seal.
3. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with .
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size is determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding; 0.106-inch-diameter shank, length to suit depth of insulation indicated.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) Gemco.
        3) Midwest Fasteners, Inc.
        4) Nelson Stud Welding.
        5) Or approved equal.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding; 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) CL WARD & Family Inc.
        3) Gemco.
        4) Midwest Fasteners, Inc.
        5) Or approved equal.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) AGM Industries, Inc.
        2) Gemco.
        3) Midwest Fasteners, Inc.
        4) Or approved equal.

    b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
    c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch- diameter shank; length to suit depth of insulation indicated.
    d. Adhesive: Recommended by hanger manufacturer. Use product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Gemco.
2) Midwest Fasteners, Inc.
3) AGM Industries, Inc.
4) Or approved equal.

b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
c. Spindle: Nylon, 0.106-inch- diameter shank; length to suit depth of insulation indicated, up to 2-1/2 inches.
d. Adhesive: Recommended by hanger manufacturer. Use product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) AGM Industries, Inc.
2) Gemco.
3) Midwest Fasteners, Inc.
4) Or approved equal.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Aluminum, fully annealed; 0.106-inch- diameter shank; length to suit depth of insulation indicated.
d. Adhesive-backed base with a peel-off protective cover.

6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, stainless steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) AGM Industries, Inc.
2) Gemco.
3) Midwest Fasteners, Inc.
4) Nelson Stud Welding.
5) Or approved equal.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & F Wire.
b. Johns Manville; a Berkshire Hathaway company.
c. RPR Products, Inc.
d. Or approved equal.

2.12 CORNER ANGLES

A. PVC Corner Angles: 30-mils- thick, minimum 1- by 1-inch PVC in accordance with ASTM D1784, Class 16354-C, white or color-coded to match adjacent surface.

B. Aluminum Corner Angles: 0.040-inch- thick, minimum 1- by 1-inch aluminum in accordance with ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

C. Stainless Steel Corner Angles: 0.024-inch- thick, minimum 1- by 1-inch stainless steel in accordance with ASTM A240/A240M, Type 304.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range of between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment.

B. Install insulation materials, forms, vapor barriers or retarders, and jackets, of thicknesses required for each item of equipment, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with the Contract Documents, unless otherwise approved by the Commissioner.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 2 inches o.c.
4. For below-ambient services, apply vapor-barrier mastic over staples.
5. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
6. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints.

L. Cut insulation in a manner to avoid compressing insulation.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

O. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.5 INSTALLATION OF EQUIPMENT, TANK, AND VESSEL INSULATION

A. Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive, anchor pins, and speed washers.

1. Apply adhesives in accordance with manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.
2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
3. Protect exposed corners with secured corner angles.

4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:

    a. Do not weld anchor pins to ASME-labeled pressure vessels.
    b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
    c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints and 16 inches o.c. in both directions.
    d. Do not compress insulation during installation.
    e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
    f. Impale insulation over anchor pins, and attach speed washers.
    g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

5. Secure each layer of insulation with stainless steel or aluminum bands. Select band material compatible with insulation materials.
6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches from each end. Install wire or cable between two circumferential girdles 12 inches o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches o.c. Use this network for securing insulation with tie wire or bands.
7. Stagger joints between insulation layers at least 3 inches.
8. Install insulation in removable and replaceable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

B. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.

1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
2. Seal longitudinal seams and end joints.

C. Insulation Installation on Pumps:

1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch centers, starting at corners. Install 3/8-inch- diameter fasteners with wing nuts. Alternatively, secure the box sections together using a field-adjustable latching mechanism.
2. Fabricate boxes from aluminum, at least 0.050 inch thick.
3. For below-ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Install in accordance with manufacturer's written installation instructions and ASTM C1710.

B. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

3.8 FINISHES

A. Equipment Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Commissioner. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless steel jackets.

3.9 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections: Inspect field-insulated equipment, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection is limited to one location(s) for each type of equipment defined in "Indoor Equipment Insulation Schedule" and "Outdoor, Aboveground Equipment Insulation Schedule" articles. For large equipment, remove only a portion adequate to determine compliance.

C. All insulation applications will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 EQUIPMENT INSULATION SCHEDULE, GENERAL

A. Insulation conductivity and thickness per pipe size comply with schedules in this Section or with requirements of 2014 NYC Building Codes, whichever is more stringent.

B. Acceptable insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials is Contractor's option.

3.11 BREECHING INSULATION SCHEDULE

A. Round, exposed breeching and connector insulation is one of the following:

1. Mineral Wool Blanket: 3 inches thick and 4 lb/cu. ft. nominal density.

B. Round, concealed breeching and connector insulation is one of the following:

1. Mineral Wool Blanket: 3 inches thick and 4 lb/cu. ft. nominal density.

3.12 INDOOR EQUIPMENT INSULATION SCHEDULE

A. Insulate indoor and outdoor equipment that is not factory insulated.

B. Heating-hot-water pump insulation is one of the following:

1. Glass-Fiber Board: 2 inches thick and 6 lb/cu. ft. nominal density.
2. Mineral Wool Board: 2 inches thick and 6 lb/cu. ft. nominal density.

C. Heating-hot-water expansion/compression tank insulation is one of the following:

1. Glass-Fiber Pipe and Tank: 2 inches thick.
2. Mineral Wool Pipe and Tank: 2 inches thick.

D. Heating-hot-water air-separator insulation is one of the following:

1. Glass-Fiber Pipe and Tank: 2 inches thick.
2. Mineral Wool Pipe and Tank: 2 inches thick.

E. Piping system filter-housing insulation is one of the following:

1. Glass-Fiber Pipe and Tank: 2 inches thick.
2. Mineral Wool Pipe and Tank: 2 inches thick.

3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Equipment, Concealed:

1. PVC: 20 mils thick.

END OF SECTION 230716

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes insulation for HVAC piping systems.

B. Related Requirements:

1. Section 230713 "Duct Insulation" for duct insulation.
2. Section 230716 "HVAC Equipment Insulation" for equipment insulation.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

B. Sustainable Design Submittals:

1. Product Data: For adhesives, mastics, and sealants, indicating VOC content.
2. Laboratory Test Reports: For adhesives, mastics, and sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use.

1. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
2. Sheet Form Insulation Materials: 12 inches square.
3. Jacket Materials for Pipe: 12 inches long by NPS 2.
4. Sheet Jacket Materials: 12 inches square.
5. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.5 INFORMATIONAL SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include name of manufacturer, fabricator, type, description, and size, as well as ASTM standard designation, and maximum use temperature.

1.8 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84 by a testing agency. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. All Insulation Installed Indoors; Outdoors-Installed Insulation in Contact with Airstream: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
3. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," and "Indoor Piping Insulation Schedule," articles for where insulating materials are applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Comply with ASTM C552.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Owens Corning.
b. Johns Manville.
c. Knauf Insulation.
d. Or approved equal.

2. Preformed Pipe Insulation without Jacket: Type II, Class 1, unfaced.
3. Preformed Pipe Insulation with Jacket: Type II, Class 2, with factory-applied ASJ jacket.
4. Fabricated shapes in accordance with ASTM C450, ASTM C585, and ASTM C1639.
5. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

G. Flexible Elastomeric: Closed-cell, or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534/C534M, Type I, for tubular materials, Type II for sheet materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Aeroflex USA.
b. Armacell LLC.
c. K-Flex USA.
d. Or approved equal.

H. Glass-Fiber, Preformed Pipe: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 850 deg F in accordance with ASTM C411. Comply with ASTM C547.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Knauf Insulation.
c. Manson Insulation Inc.
d. Owens Corning.
e. Or approved equal.

2. Preformed Pipe Insulation: Type I, Grade A, unfaced.
3. Fabricated shapes in accordance with ASTM C450 and ASTM C585.
4. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Mineral Wool, Preformed Pipe: Mandrel-wound mineral wool fibers bonded with a thermosetting resin, unfaced; suitable for maximum use temperature up to 1200 deg F in accordance with ASTM C447. Comply with ASTM C547.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Owens Corning.
c. ROCKWOOL Technical Insulation.
d. Or approved equal.

2. Preformed Pipe Insulation: Type II, Grade A, unfaced.
3. Fabricated shapes in accordance with ASTM C450 and ASTM C585.

J. Glass-Fiber, Pipe and Tank: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 850 deg F, in accordance with ASTM C411. Comply with ASTM C1393.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation; Saint-Gobain North America.
b. Johns Manville; a Berkshire Hathaway company.
c. Knauf Insulation.

d. Manson Insulation Inc.
e. Owens Corning.
f. Or approved equal.

2. Semirigid board material with factory-applied ASJ jacket.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

K. Mineral Wool, Pipe and Tank: Mineral wool fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 1000 deg F, in accordance with ASTM C411. Comply with ASTM C1393.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Owens Corning.
c. Rockwool International.
d. Or approved equal.

2. Semirigid board material with factory-applied ASJ jacket.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

L. Polyisocyanurate: Prefabricated, rigid cellular polyisocyanurate material intended for use as thermal insulation. Comply with ASTM C591.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Owens Corning.
c. Rockwool International.
d. Or approved equal.

2. Prefabricated insulation, with factory-applied ASJ.
3. Type IV, except thermal conductivity (k-value) do not exceed 0.19 Btu x in./h x sq. ft. x deg F at 75 deg F after 180 days of aging.
4. Flame-spread index is 25 or less, and smoke-developed index is 50 or less for thicknesses of up to 1.5 inch as tested in accordance with ASTM E84.
5. Fabricated shapes in accordance with ASTM C450 and ASTM C585.
6. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

M. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C578, Type I-XII for board or Type XIII for pipe insulation, except thermal conductivity (k-value) do not exceed 0.26 Btu x in./h x sq. ft. x deg F after 180 days of aging. Fabricate shapes in accordance with ASTM C450 and ASTM C585.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Chemical Co., sold through Polyguard Products, Inc.
b. Armacell.
c. Johns Manville; a Berkshire Hathaway company.
d. Or approved equal.

2.3 INSULATING CEMENTS

A. Glass-Fiber and Mineral Wool Insulating Cement: Comply with ASTM C195.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Carlisle.
   b. Childers.
   c. Duro Dyne.
   d. Or approved equal.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C196.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Carlisle.
   b. Childers.
   c. Duro Dyne.
   d. Or approved equal.

C. Glass-Fiber and Mineral Wool Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Carlisle.
   b. Childers.
   c. Duro Dyne.
   d. Or approved equal.

2.4 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Foster Brand; H. B. Fuller Construction Products.
   b. Carlisle.
   c. Childers.
   d. Duro Dyne.
   e. Or approved equal.

2. Adhesive: As recommended by cellular glass manufacturer and with a VOC content of 80 g/L or less.

3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Phenolic and Polyisocyanurate Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Carlisle.
    d. Duro Dyne.
    e. Or approved equal.

2. Adhesive: As recommended by phenolic and polyisocyanate manufacturer and with a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Flexible Elastomeric and Polyolefin Adhesive: Solvent-based adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Aeroflex USA.
    b. Armacell LLC.
    c. K-Flex USA.
    d. Or approved equal.

2. Adhesive: As recommended by flexible elastomeric and polyolefin manufacturer and with a VOC content of 80 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Flame-spread index is 25 or less and smoke-developed index is 50 or less as tested in accordance with ASTM E84.
5. Wet Flash Point: Below 0 deg F.
6. Service Temperature Range: 40 to 200 deg F.
7. Color: Black.

E. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Mon-Eco Industries, Inc.
    d. Or approved equal.

2. Adhesive: As recommended by mineral fiber manufacturer and with a VOC content of 80 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Carlisle.
    d. Duro Dyne.
    e. Or approved equal.

2. Adhesive: As recommended by polystyrene manufacturer and with a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

G. ASJ Adhesive and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A, for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Mon-Eco Industries, Inc.
    d. Or approved equal.

2. Adhesives must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

H. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. P.I.C. Plastics, Inc.
    c. Proto Corporation.
    d. Speedline Corporation.
    e. The Dow Chemical Company.
    f. Or approved equal.

2. Adhesive: As recommended by Adhesive - PVC Jacket manufacturer and with a VOC content of 50 g/L or less.

3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

1. Mastics: As recommended by insulation manufacturer and with a VOC content of 50 g/L or less.
2. Mastics must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Vapor-Retarder Mastic, Water Based: Suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Knauf Insulation.
   d. Mon-Eco Industries, Inc.
   e. Vimasco Corporation.
   f. Or approved equal.

2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Comply with MIL-PRF-19565C, Type II, for permeance requirements, with supplier listing on DOD QPD - Qualified Products Database.
5. Color: White.

2.6 LAGGING ADHESIVES

A. Adhesives comply with MIL-A-3316C, Class I, Grade A, and are compatible with insulation materials, jackets, and substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Vimasco Corporation.
   d. Or approved equal.

2. Adhesive must be as recommended by insulation manufacturer and must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

4. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
5. Service Temperature Range: 0 to plus 180 deg F.
6. Color: White.

2.7 SEALANTS

A. Materials are as recommended by the insulation manufacturer and are compatible with insulation materials, jackets, and substrates.

B. Joint Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Mon-Eco Industries, Inc.
   d. Owens Corning.
   e. Or approved equal.

2. Permanently flexible, elastomeric sealant.

   a. Service Temperature Range: Minus 150 to plus 250 deg F.
   b. Color: White or gray.

3. Sealant must have a VOC content of 420 g/L or less.
4. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Mon-Eco Industries, Inc.
   d. Or approved equal.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.
5. Sealant must have a VOC content of 420 g/L or less.
6. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. ASJ Flashing Sealants and PVDC and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Elgen.
    d. Precision Adhesives.
    e. Or approved equal.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. Sealant must have a VOC content of 420 g/L or less.
6. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.8 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.
4. ASJ+: Aluminum foil reinforced with glass scrim bonded to a kraft paper interleaving with an outer film leaving no paper exposed; complying with ASTM C1136, Types I, II, III, IV, and VII.
5. PSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C1136, Type II.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C1136, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Airex Manufacturing.
    b. Johns Manville; a Berkshire Hathaway company.
    c. P.I.C. Plastics, Inc.

d. Proto Corporation.
e. Speedline Corporation.
f. Or approved equal.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Metal Jacket:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. 3M.
c. RPR Products, Inc.
d. Or approved equal.

2. Aluminum Jacket: Comply with ASTM B209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

a. Factory cut and rolled to size.
b. Finish and thickness are indicated in field-applied jacket schedules.
c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
e. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.
2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

3. Stainless Steel Jacket: ASTM A240/A240M.

a. Factory cut and rolled to size.
b. Material, finish, and thickness are indicated in field-applied jacket schedules.
c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
e. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.
2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

E. Self-Adhesive Outdoor Jacket (Asphaltic): 60-mil- thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a cross-laminated polyethylene film covered with whitestucco-embossed aluminum-foil facing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. MFM Building Products Corp.
b. Polyguard Products, Inc.
c. 3M.
d. Or approved equal.

F. Self-Adhesive Indoor/Outdoor Jacket (Non-Asphaltic): Vapor barrier and waterproofing jacket for installation over insulation located aboveground outdoors or indoors. Specialized jacket has five layers of laminated aluminum and polyester film with low-temperature acrylic pressure-sensitive adhesive. Outer aluminum surface is coated with UV-resistant coating for protection from environmental contaminants.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M.
b. Foster Brand; H. B. Fuller Construction Products.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Or approved equal.

2. Permeance: 0.00 perm as tested in accordance with ASTM F1249.
3. Flamespread/Smoke Developed: 25/50 as tested in accordance with ASTM E84.
4. Aluminum Finish: Smooth.

G. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm when tested in accordance with ASTM E96/E96M and with a flame-spread index of 10 and a smoke-developed index of 20 when tested in accordance with ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Proto Corporation.
c. Speedline Corporation.
d. Or approved equal.

H. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm when tested in accordance with ASTM E96/E96M and with a flame-spread index of 25 and a smoke-developed index of 50 when tested in accordance with ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Proto Corporation.
c. Speedline Corporation.
d. Or approved equal.

I. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Proto Corporation.
c. Speedline Corporation.
d. Or approved equal.

2.10 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Avery Dennison Corporation, Specialty Tapes Division.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Or approved equal.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Avery Dennison Corporation, Specialty Tapes Division.

c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Johns-Manville.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Or approved equal.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Avery Dennison Corporation, Specialty Tapes Division.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Or approved equal.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

E. PVDC Tape for Indoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. 3M.
c. Ideal Tape Co., Inc.
d. Or approved equal.

2. Width: 3 inches.
3. Film Thickness: 2 mils.
4. Adhesive Thickness: 1.5 mils.
5. Elongation at Break: 120 percent.
6. Tensile Strength: 20 psi in width.

F. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. 3M.
   c. Ideal Tape Co., Inc.
   d. Or approved equal.

2. Width: 3 inches.
3. Film Thickness: 6 mils.
4. Adhesive Thickness: 1.5 mils.
5. Elongation at Break: 145 percent.
6. Tensile Strength: 55 psi in width.

2.11 SECUREMENTS

A. Bands:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. 3M.
   c. RPR Products, Inc.
   d. Or approved equal.

2. Stainless Steel: ASTM A240/A240M, Type 304; 0.015 inch thick, 1/2 inchwide with closed seal.
3. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inchwide with closed seal.
4. Springs: Twin spring set constructed of stainless steel, with ends flat and slotted to accept metal bands. Spring size is determined by manufacturer for application.

B. Staples: Outward-clinching insulation staples, nominal 3/4 inch wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. C & F Wire.
   b. Johns Manville; a Berkshire Hathaway company.
   c. RPR Products, Inc.
   d. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom (12 o'clock and 6 o'clock positions) of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with the Contract Documents.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 2 inches o.c.
4. For below-ambient services, apply vapor-barrier mastic over staples.
5. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
6. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.

3.5 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles below.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using prefabricated fitting insulation made from same material and density as that of adjacent pipe insulation. Each piece is butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with prefabricated fitting insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using prefabricated fitting insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using prefabricated fitting insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions using a section of oversized preformed pipe insulation to fit. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers. Installation conforms to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as that of pipe insulation. Where voids are difficult to fill with block insulation, fill the voids with a fibrous insulation material suitable for the specific operating temperature.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When preformed sections of insulation are not available, install mitered or routed sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.8 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install sections of pipe insulation and miter if required in accordance with manufacturer's written instructions.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated valve covers manufactured of same material as that of pipe insulation when available.
2. When prefabricated valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.9 INSTALLATION OF GLASS-FIBER AND MINERAL WOOL INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with glass-fiber or mineral-wool blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated sections are not available, install fabricated sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.10 INSTALLATION OF POLYISOCYANURATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic.

3. All insulation is tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, and same thickness as that of adjacent pipe insulation, not to exceed 1-1/2-inch thickness.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as that of pipe insulation. Where voids are difficult to fill with block insulation, fill the voids with a fibrous insulation material suitable for the specific operating temperature.

C. Insulation Installation on Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of polyisocyanurate insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.11 INSTALLATION OF POLYSTYRENE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic.
3. All insulation is tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, and make thickness same as that of adjacent pipe insulation, not to exceed 1-1/2 inches.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness that of as pipe insulation. Where voids are difficult to fill with block insulation, fill the voids with a fibrous insulation material suitable for the specific operating temperature.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated insulation sections of same material as that of straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated section of polystyrene insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.12 INSTALLATION OF FIELD-APPLIED JACKETS

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated and for horizontal applications, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

E. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
2. Wrap presized jackets around individual pipe insulation sections, with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.

3. Continuous jacket can be spiral-wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches or less. The 33-1/2-inch- circumference limit allows for 2-inch-overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.13 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Commissioner. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless steel jackets.

3.14 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections: Inspect pipe, fittings, strainers, and valves, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection is limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.15 PIPING INSULATION SCHEDULE, GENERAL

A. Insulation conductivity and thickness per pipe size comply with schedules in this Section or with requirements of 2014 NYC Building Codes, whichever is more stringent.

B. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.16 INDOOR PIPING INSULATION SCHEDULE

A. Heating-Hot-Water Supply and Return, 200 Deg F and Below:

1. NPS 12 and Smaller: Insulation is one of the following:

a. Cellular Glass: 2 inches thick.
b. Glass-Fiber, Preformed Pipe, Type I: 2 inches thick.
c. Mineral Wool, Preformed Pipe, Type II: 2 inches thick.
d. Phenolic: 1-1/2 inches thick.
e. Polyisocyanurate: 1 inch thick.

2. NPS 14 and Larger: Insulation is one of the following:

a. Cellular Glass: 2 inches thick.
b. Glass-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
c. Mineral Wool, Preformed Pipe Insuation, Type II: 2 inches thick.
d. Phenolic: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation is one of the following:

a. Cellular Glass: 1-1/2 inches thick.
b. Flexible Elastomeric: 1 inch thick.
c. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
d. Mineral Wool, Preformed Pipe Insulation, Type II: 1 inch thick.
e. Phenolic: 1 inch thick.
f. Polyisocyanurate: 1 inch thick.
g. Polyolefin: 1 inch thick.

C. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation is one of the following:

a. Flexible Elastomeric: 2 inches thick.
b. Polyolefin: 2 inches thick.

D. Refrigerant Liquid Piping:

1. All Pipe Sizes: Insulation is one of the following:

    a. Cellular Glass: 1-1/2 inches thick.
    b. Flexible Elastomeric: 1 inch thick.
    c. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
    d. Mineral Wool, Preformed Pipe Insulation, Type II: 1 inch thick.
    e. Phenolic: 1 inch thick.
    f. Polyisocyanurate: 1 inch thick.
    g. Polyolefin: 1 inch thick.

3.17 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Heating-Hot-Water Supply and Return, 200 Deg F and Below:

1. All Pipe Sizes: Insulation is one of the following:

    a. Cellular Glass: 3 inches thick.
    b. Glass-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
    c. Mineral Wool, Preformed Pipe Insulation, Type II: 2 inches thick.
    d. Phenolic: 2 inches thick.
    e. Polyisocyanurate: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation is one of the following:

    a. Cellular Glass: 2 inches thick.
    b. Flexible Elastomeric: 2 inches thick.
    c. Glass-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
    d. Mineral Wool, Preformed Pipe Insulation, Type II: 2 inches thick.
    e. Phenolic: 2 inches thick.
    f. Polyisocyanurate: 2 inches thick.
    g. Polystyrene: 2 inches thick.

C. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation is the following:

    a. Flexible Elastomeric: 2 inches thick.

D. Refrigerant Liquid Piping:

1. All Pipe Sizes: Insulation is one of the following:

    a. Flexible Elastomeric: 1 inch thick.
    b. Polyolefin: 1 inch thick.

3.18 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. PVC: 20 mils thick.

D. Piping, Exposed:

1. Aluminum, Smooth: 0.020 inch thick.

3.19 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. Piping, Exposed:

1. Stainless Steel, Type 304, Smooth No. 2B Finish: 0.016 inch thick.

END OF SECTION 230719

SECTION 230800 - COMMISSIONING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the project: (1) the contract drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the contract [City of New York Standard Construction Contract.]

1.2 SUMMARY

A. This section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

B. Related Sections:

1. DDC General Conditions for general commissioning process requirements.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

B. In addition, provide the following:

1. Certificates of readiness
2. Certificates of completion of installation, pre-start, and startup activities.
3. O&M manuals
4. Field / factory test reports

C. Control Drawings Submittal

1. The control drawings shall have a key to all abbreviations.
2. The control drawings shall contain graphic schematic depictions of the systems and each component.
3. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
4. Provide a full points list with at least the following included for each point, as applicable:

    a. Controlled system
    b. Point abbreviation
    c. Point description
    d. Display unit
    e. Control point or set point
    f. Monitoring point
    g. Intermediate point

h. Calculated point

1.4 DESCRIPTION

A. Commissioning: Commissioning is a systematic process of verifying that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the City of New York with an unbiased, objective view of the system's installation, operation and performance. This process does not eliminate or reduce the responsibility of the Contractor to provide a complete design or finished product. Commissioning is intended to enhance the quality of each system installation, startup and transfer to beneficial use by the City of New York.

B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout.
2. Verify and document proper performance of equipment and systems as per the written procedures.
3. Verify that Operation & Maintenance documentation is complete and transferred to City of New York.
4. Verify that proper orientation program has been implemented for the City of New York's operating personnel.
5. Provide a post occupancy review with O&M staff within 10 months after Substantial Completion.

C. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, balancing and verification and performance checkouts.

D. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Contractor, subcontractors, manufacturers and equipment suppliers. The Cx process shall not reduce the responsibility of the Contractor to comply with the Contract Documents.

1.5 DEFINITIONS

A. Refer to DDC General Conditions for definitions.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Test Equipment Calibration Requirements: Contractor will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

C. Refer to DDC General Conditions for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by contractor for the equipment being tested as outlined in the DDC General Conditions, except for equipment specific to and used by the contractor in their commissioning responsibilities. A sufficient quantity of two-way radios shall be provided by the contractor, as necessary.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included.

C. Test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Test equipment (and software) shall become the property of the City of New York upon completion of the commissioning process.

D. If required and necessary, data logging equipment and software required for testing will be provided by the CxA, but shall not become the property of the City of New York.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5˚F and a resolution of ±0.1˚F. Pressure sensors shall have an accuracy of ±2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

B. With assistance from the installers, the CxA will prepare Pre-Functional/ Installation Checklists for commissioned components, equipment, and systems

C. Create Red-lined Drawings:

1. Verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
2. Preliminary, red-lined drawings will be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.

3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
4. Create the as-built drawings.

D. Operation and Maintenance Data:

1. Provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
2. The CxA will review the O&M literature once for conformance to project requirements.
3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the contractor.

E. Testing, Demonstration and Orientation:

1. Provide demonstration and operator's orientation program as required /by the Contract Documents.
2. A complete orientation program and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any such event.
3. Agenda for each orientation session shall be submitted to the CxA at least one (1) week prior to the session.
4. The CxA shall be notified at least 72 hours in advance of scheduled tests so that testing may be observed by the CxA. A copy of the test record shall be provided to the CxA.
5. Engage a Factory-authorized service representative to demonstrate facilities maintenance personnel to adjust, operate, and maintain specific equipment.

F. Instruct City of New York's service personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining equipment.

G. Review and update data in O&M Manuals.

3.2 CONTRACTOR RESPONSIBILITIES FOR SUBCONTRACTOR PERFORMANCE

A. The Contractor shall have the following instruction responsibilities in performing Mechanical, Controls and TAB work. The commissioning responsibilities are as follows (all references apply to commissioned equipment/systems only):

1. Perform commissioning tests at the direction of the CxA.
2. Attend construction phase controls coordination meetings.
3. Attend testing, adjusting, and balancing review and coordination meetings.
4. Participate in HVAC&R systems, assemblies, equipment, and component service orientation and inspection as directed by the CxA.
5. Provide information requested by the CxA for final commissioning documentation.
6. Include requirements for submittal data, operation and maintenance data, and instruction in each purchase order or sub-contract written.
7. Prepare preliminary schedule for Mechanical system orientations and inspections, operation and maintenance manual submissions, instruction sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for the City of New York. Distribute preliminary schedule to commissioning team members.
8. Update schedule as required throughout the construction period.

9. During the startup and initial checkout process, execute the related portions of the Prefunctional/installation checklists for all commissioned equipment.
10. Assist the CxA in all verification and functional performance tests.
11. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
12. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA (45) days after submittal acceptance.
13. Coordinate with the CxA to provide (72) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.
14. Notify the CxA a minimum of (2) weeks in advance of the time for start of the testing and balancing work. Attend the initial testing and balancing meeting for review of the official testing and balancing procedures.
15. Participate in, and schedule vendors and subcontractors to participate in the operator's orientation sessions.
16. Provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.

    a. HVAC&R equipment including all fans, air handling units, piping, ductwork, dampers, terminals, and all other equipment furnished under this Division.
    b. Controls system used for equipment monitoring and manipulation
    c. Fire stopping in the fire rated construction, including fire and smoke damper installation, caulking, gasketing and sealing of smoke barriers.
    d. Fire detection and smoke detection devices furnished under other divisions of the specification.
    e. The equipment supplier shall document the performance of his equipment.
    f. Perform work as follows:

        1) Attend initial commissioning coordination meeting scheduled by the CvA.
        2) Submit the site specific testing and balancing plan to the CxA and Commissioner for review and acceptance.
        3) Attend the testing and balancing review meeting scheduled by the CxA. Be prepared to discuss the procedures that shall be followed in testing, adjusting, and balancing the HVAC&R system.
        4) At the completion of the testing and balancing work, and the submittal of the final testing and balancing report, notify the Commissioner.
        5) Participate in verification of the testing and balancing report, which will consist of repeating measurements contained in the testing and balancing reports. Assist in diagnostic purposes when directed.

            a) Equipment Suppliers

    g. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the City of New York, to keep warranties in force.
    h. Assist in equipment testing per agreements with contractors.
    i. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

3.3 CxA RESPONSIBILITIES

A. Refer to DDC General Conditions for CxA's Responsibilities.

3.4 TESTING PREPARATION

A. Certify in writing to the CxA that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify in writing that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.5 TESTING, ADJUSTING AND BALANCING VERIFICATION

A. Air and water testing, balancing and equipment performance verification shall be accomplished by an independent test and balance firm. The CxA shall spot check this work to verify accuracy of results.

B. Prior to performance of Testing, Adjusting and Balancing work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

C. Notify the CxA at least ten (10) days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.

D. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

1. The CxA will notify contractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
2. Use the same instruments (by model and serial number) that were used when original data were collected.
3. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.6 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include verification of dynamic operation of the system.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the subcontractors performing HVAC&R, testing and balancing, and HVAC&R Instrumentation and Control work shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct to alter set points when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.7 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 23 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 23 Sections. Assist the CxA with preparation of testing plans.

C. Pipe system cleaning: flushing, hydrostatic tests, and chemical treatment: Test requirements are specified in Division 23 piping Sections. Prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include but not limited to the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

F. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

G. Vibration Analysis and Sound Level Testing: Prepare a vibration analysis and sound level testing plan for identified rotating equipment. Coordinate witnessing of testing with CxA.

H. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:

1. HVAC systems
2. Boilers
3. Building Automation System
4. Ductwork and accessories
5. Heating Hot Water System
6. Testing, Adjusting and Balancing

3.8 APPROVAL

A. Refer to DDC General Conditions for approval procedures.

3.9 SEASONAL TESTING

A. Refer to DDC General Conditions for Seasonal Testing procedures.

3.10 OPERATION AND MAINTENANCE MANUALS

A. The Operation and Maintenance Manuals shall conform to the DDC General Conditions.

B. Refer to the DDC General Conditions for CxA's role in the Operation and Maintenance Manual contribution, review and approval process.

C. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.

3.11 CITY OF NEW YORK'S OPERATING PERSONNEL ORIENTATION

A. Refer to the DDC General Conditions for requirements for instruction.

B. The contractor shall have the following instruction responsibilities:

1. Provide the CxA with an instruction plan two weeks before the planned instruction.
2. Provide designated City of New York personnel with comprehensive orientation and instruction in the understanding of the systems and the operation and service of each piece of HVAC equipment including, but not limited to, all HVAC equipment (ex. pumps, heat exchangers, chillers, heat rejection equipment, air conditioning units, air handling units, fans, terminal units, controls and water treatment systems, etc.)
3. Instruction shall normally start with classroom sessions followed by hands-on instruction on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installer or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the instruction.
6. Attend instruction sessions other than their respective instruction sessions, as requested, to discuss the interaction of various systems as it relates to the equipment being covered in the instruction session.
7. The instruction sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
8. Instruction shall include:

    a. Use of the printed installation, operation and service instruction material included in the O&M manuals.
    b. Discussion of relevant health and safety issues and concerns.
    c. Discussion of warranties and guarantees.
    d. Common troubleshooting problems and solutions.
    e. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
    f. Discussion of any peculiarities of equipment installation or operation.
    g. The format and instruction agenda in The HVAC Commissioning Process, ASHRAE Guideline 1-2007, is recommended.

1) Hands-on instruction shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
2) The contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
3) Instruction shall occur after functional testing is complete, unless approved otherwise by the Commissioner.

C. Control System Work: The contractor shall have the following instruction responsibilities:

1. Provide the CxA and Commissioner with an instruction plan four weeks before the planned instruction.
2. Provide designated City of New York personnel instruction on the control system in this facility. The intent is to clearly and completely instruct the City of New York on all the capabilities of the control system.
3. Instruction manuals: The standard operating manual for the control system and any special instruction manuals will be provided for each employee, with three extra copies left for the O&M manuals. In addition, copies of the control system technical manual will be demonstrated during instruction and three copies submitted with the O&M manuals. Manuals shall include detailed description of the subject matter for each session. The manuals will cover all control sequences and have a definitions section that fully describes all relevant words used in the manuals and in all software displays. Manuals will be approved by the CxA. Copies of audiovisuals shall be delivered to the City of New York.
4. The instruction sessions will be tailored to the needs and skill-level of the trainees.
5. The instructors will be knowledgeable on the system and its use in buildings. For the on-site sessions, the most qualified instructor(s) will be used. The Commissioner shall approve the instructor prior to scheduling the instructo.
6. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
7. Attend sessions other than the controls instruction, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
8. Three (3) instruction sessions shall be provided:

a. Instruction Session I, Control System: The first instruction session shall consist of 8 hours of actual instruction. This instruction may be held on-site or in the supplier's facility. If held off-site, the instruction may occur prior to final completion of the system installation. Upon completion, each employee, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
b. Instruction Session II, Building Systems: The second session shall be held on-site for a period of 8 hours of actual hands-on instruction after the completion of system commissioning. The session shall include instruction on:

1) Specific hardware configuration of installed systems in this building and specific instruction for operating the installed system, including HVAC systems, lighting controls and any interface with security and communication systems.

2) Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing set points and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
3) All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends. Employees will actually set-up trends in the presence of the instructor.
4) Every display screen shall be completely discussed, allowing time for questions.
5) Use of keypad or plug-in laptop computer at the zone level.
6) Use of remote access to the system via phone lines or networks.
7) Setting up and changing an air terminal unit controller.
8) Graphics generation.
9) Point database entry and modifications.
10) Understanding of field control panel operating programming (when applicable

c. Instruction Session III, Operational Q&A: The third instruction session shall be conducted on-site six months after occupancy and consist of 8 hours of instruction. The session will be structured to address specific topics that employees need to discuss and to answer questions concerning operation of the system.

D. Test, Adjust and Balance Work: The contractor shall have the following instruction responsibilities:

1. Meet with facility staff after completion of Test, Adjust and Balance work and instruct them on the following:

a. Review the final Test, Adjust and Balance report, explaining the layout and meanings of each data type.
b. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
c. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are not meeting their design capacity.
d. Discuss any temporary settings for any areas that are not finished, and plans to finish the areas.
e. Other salient information that may be useful for facility operations, relative to Test, Adjust and Balance work.

END OF SECTION 230800

SECTION 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Direct digital control system equipment and components for monitoring and controlling of HVAC, exclusive of instrumentation and control devices.

B. Related Requirements:

1. Section 230923.13 "Energy Meters" for thermal and electric power energy meters that connect to Direct Digital Control systems.
2. Section 230923.22 "Position Instruments" for limit switches that connect to Direct Digital Control systems.
3. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control" for control sequences in Direct Digital Control systems.
4. Section 270553 "Identification for Communications Systems" for identification requirements for communications components.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Multiple Submissions:

1. If multiple submissions are required to execute work within schedule, first submit a coordinated schedule clearly defining intent of multiple submissions. Include a proposed date of each submission with a detailed description of submittal content to be included in each submission.
2. Clearly identify each submittal requirement indicated and in which submission the information will be provided.
3. Include an updated schedule in each subsequent submission with changes highlighted to easily track the changes made to previous submitted schedule.

B. Product Data:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
3. Product description with complete technical data, performance curves, and product specification sheets.
4. Installation, operation, and maintenance instructions including factors effecting performance.
5. Bill of materials of indicating quantity, manufacturer, and extended model number for each unique product.

    a. Workstations.
    b. Printers.
    c. Servers.
    d. Gateways.
    e. Routers.
    f. Protocol analyzers.
    g. Direct Digital Control controllers.
    h. Enclosures.
    i. Electrical power devices.
    j. UPS units.
    k. Accessories.
    l. Instruments.
    m. Control dampers and actuators.
    n. Control valves and actuators.

6. When manufacturer's product datasheets apply to a product series rather than a specific product model, clearly indicate and highlight only applicable information.
7. Each submitted piece of product literature to clearly cross reference specification and drawings that submittal is to cover.

C. Software Submittal:

1. Cross-referenced listing of software to be loaded on each operator workstation, server, gateway, and Direct Digital Control controller.
2. Description and technical data of all software provided and cross-referenced to products in which software will be installed.
3. Operating system software, operator interface and programming software, color graphic software, Direct Digital Control controller software, maintenance management software, and third-party software.
4. Include a flow diagram and an outline of each subroutine that indicates each program variable name and units of measure.
5. Listing and description of each engineering equation used with reference source.
6. Listing and description of each constant used in engineering equations and a reference source to prove origin of each constant.
7. Description of operator interface to alphanumeric and graphic programming.
8. Description of each network communication protocol.

9. Description of system database, including all data included in database, database capacity, and limitations to expand database.
10. Description of each application program and device drivers to be generated, including specific information on data acquisition and control strategies showing their relationship to system timing, speed, processing burden, and system throughout.
11. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

D. Shop Drawings:

1. General Requirements:

    a. Include cover drawing with Project name, location, Contractor, and issue date with each Shop Drawings submission.
    b. Include a drawing index sheet listing each drawing number and title that matches information in each title block.
    c. Drawings Size: 11x17.

2. Include plans, elevations, sections, and mounting details where applicable.
3. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
4. Detail means of vibration isolation and show attachments to rotating equipment.
5. Plan Drawings indicating the following:

    a. Screened backgrounds of walls, structural grid lines, HVAC equipment, ductwork, and piping.
    b. Room names and numbers with coordinated placement to avoid interference with control products indicated.
    c. Each desktop workstation network port, server, gateway, router, Direct Digital Control controller, control panel instrument connecting to Direct Digital Control controller, and damper and valve connecting to Direct Digital Control controller, if included in Project.
    d. Exact placement of products in rooms, ducts, and piping to reflect proposed installed condition.
    e. Network communication cable and raceway routing.
    f. Proposed routing of wiring, cabling, conduit, and tubing; coordinated with building services for review before installation.

6. Schematic drawings for each controlled HVAC system indicating the following:

    a. I/O points labeled with point names shown. Indicate instrument range, normal operating set points, and alarm set points. Indicate fail position of each damper and valve, if included in Project.
    b. I/O listed in table format showing point name, type of device, manufacturer, model number, and cross-reference to product data sheet number.
    c. A graphic showing location of control I/O in proper relationship to HVAC system.
    d. Wiring diagram with each I/O point having a unique identification and indicating labels for all wiring terminals.
    e. Unique identification of each I/O that to be consistently used between different drawings showing same point.

f. Elementary wiring diagrams of controls for HVAC equipment motor circuits including interlocks, switches, relays, and interface to Direct Digital Control controllers.
g. Narrative sequence of operation.
h. Graphic sequence of operation, showing all inputs and output logical blocks.

7. Control panel drawings indicating the following:

a. Panel dimensions, materials, size, and location of field cable, raceways, and tubing connections.
b. Interior subpanel layout, drawn to scale and showing all internal components, cabling and wiring raceways, nameplates, and allocated spare space.
c. Front, rear, and side elevations and nameplate legend.
d. Unique drawing for each panel.

8. Direct Digital Control system network riser diagram indicating the following:

a. Each device connected to network with unique identification for each.
b. Interconnection of each different network in Direct Digital Control system.
c. For each network, indicate communication protocol, speed and physical means of interconnecting network devices, such as copper cable type, or optical fiber cable type. Indicate raceway type and size for each.
d. Each network port for connection of an operator workstation or other type of operator interface with unique identification for each.

9. Direct Digital Control system electrical power riser diagram indicating the following:

a. Each point of connection to field power with requirements (volts/phase//hertz/amperes/connection type) listed for each.
b. Each control power supply including, as applicable, transformers, power-line conditioners, transient voltage suppression and high filter noise units, DC power supplies, and UPS units with unique identification for each.
c. Each product requiring power with requirements (volts/phase//hertz/amperes/connection type) listed for each.
d. Power wiring type and size, race type, and size for each.

10. Monitoring and control signal diagrams indicating the following:

a. Control signal cable and wiring between controllers and I/O.
b. Point-to-point schematic wiring diagrams for each product.
c. Control signal tubing to sensors, switches, and transmitters.
d. Process signal tubing to sensors, switches, and transmitters.

11. Color graphics indicating the following:

a. Itemized list of color graphic displays to be provided.
b. For each display screen to be provided, a true color copy showing layout of pictures, graphics, and data displayed.
c. Intended operator access between related hierarchical display screens.

E. System Description:

1. Full description of Direct Digital Control system architecture, network configuration, operator interfaces and peripherals, servers, controller types and applications, gateways, routers and other network devices, and power supplies.
2. Complete listing and description of each report, log and trend for format and timing, and events that initiate generation.
3. System and product operation under each potential failure condition including, but not limited to, the following:

    a. Loss of power.
    b. Loss of network communication signal.
    c. Loss of controller signals to inputs and outpoints.
    d. Operator workstation failure.
    e. Server failure.
    f. Gateway failure.
    g. Network failure.
    h. Controller failure.
    i. Instrument failure.
    j. Control damper and valve actuator failure.

4. Complete bibliography of documentation and media to be delivered to the Commissioner .
5. Description of testing plans and procedures.
6. Description of instruction.

F. Samples:

1. For each of the following exposed product(s), installed in finished space for approval of selection of aesthetic characteristics:

    a. Gas instruments specified in Section 230923.16 "Gas Instruments."
    b. Moisture instruments specified in Section 230923.19 "Moisture Instruments."
    c. Pressure instruments specified in Section 230923.23 "Pressure Instruments."
    d. Temperature instruments specified in Section 230923.27 "Temperature Instruments."

G. System Performance Submittals: For Direct Digital Control system products and installation indicated.

1. Supporting documentation showing Direct Digital Control system design complies with performance requirements indicated, including calculations and other documentation necessary to prove compliance.
2. Schedule and design calculations for control dampers and actuators.

    a. Flow at Project design and minimum flow conditions.
    b. Face velocity at Project design and minimum airflow conditions.
    c. Pressure drop across damper at Project design and minimum airflow conditions.
    d. AMCA 500-D damper installation arrangement used to calculate and schedule pressure drop, as applicable to installation.
    e. Maximum close-off pressure.
    f. Leakage airflow at maximum system pressure differential (fan close-off pressure).
    g. Torque required at worst case condition for sizing actuator.
    h. Actuator selection indicating torque provided.

i. Actuator signal to control damper (on, close, or modulate).
j. Actuator position on loss of power.
k. Actuator position on loss of control signal.

3. Schedule and design calculations for control valves and actuators.

a. Flow at Project design and minimum flow conditions.
b. Pressure-differential drop across valve at Project design flow condition.
c. Maximum system pressure-differential drop (pump close-off pressure) across valve at Project minimum flow condition.
d. Design and minimum control valve coefficient with corresponding valve position.
e. Maximum close-off pressure.
f. Leakage flow at maximum system pressure differential.
g. Torque required at worst case condition for sizing actuator.
h. Actuator selection indicating torque provided.
i. Actuator signal to control damper (on, close or modulate).
j. Actuator position on loss of power.
k. Actuator position on loss of control signal.

4. Schedule and design calculations for selecting flow instruments.

a. Instrument flow range.
b. Project design and minimum flow conditions with corresponding accuracy, control signal to transmitter, and output signal for remote control.
c. Extreme points of extended flow range with corresponding accuracy, control signal to transmitter, and output signal for remote control.
d. Pressure-differential loss across instrument at Project design flow conditions.
e. Where flow sensors are mated with pressure transmitters, provide information for each instrument separately and as an operating pair.

H. Coordination Drawings:

1. Plan drawings and corresponding product installation details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved.
2. Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements:

1. Systems Provider's Qualification Data.
2. Testing agency's qualification data.

B. Product Certificates:

1. Data Communications Protocol Certificates: Certifying that each proposed Direct Digital Control system component complies with ASHRAE 135.

2. Data Communications Protocol Certificates: Certifying that each proposed Direct Digital Control system component complies with LonWorks.

C. Test and Evaluation Reports:

1. Product Test Reports: For each product, for tests performed by manufacturer.
2. Preconstruction Test Reports: For each separate test performed.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For Direct Digital Control system.

1. In addition to DDC General Conditions closeout requirements, include the following:

a. Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format.
b. Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.
c. As-built versions of submittal Product Data.
d. Names, addresses, email addresses, and 24-hour telephone numbers of Installer and service representatives for Direct Digital Control system and products.
e. Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing set points and variables.
f. Programming manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
g. Engineering, installation, and maintenance manuals that explain how to do the following:

1) Design and install new points, panels, and other hardware.
2) Perform preventive maintenance and calibration.
3) Debug hardware problems.
4) Repair or replace hardware.

h. Documentation of all programs created using custom programming language including set points, tuning parameters, and object database.
i. Backup copy of graphic files, programs, and databases on electronic media.
j. List of recommended spare parts with part numbers and suppliers.
k. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
l. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation software, and graphics software.
m. Licenses, guarantees, and warranty documents.
n. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.

o. Instructional materials.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Direct Digital Control System Provider Qualifications:

1. An entity that employs installers properly trained by Direct Digital Control system manufacturer for installing specified system, with an in-place support facility within reasonable distance to project site, and with the following capacity:

a. Staffing resources to execute work according to schedule.
b. Service staff assigned to support Project during warranty period.
c. Product parts inventory to support ongoing Direct Digital Control system operation for a period of not less than five years after Substantial Completion.

C. Testing Agency Qualifications: Member company of NETA.

D. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.
3. AWS D1.3/D1.3M.
4. AWS D1.4/D1.4M.

E. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials within specified warranty period.

1. Adjust, repair, or replace failures at no additional cost or reduction in service to City of New York.
2. Include updates or upgrades to software and firmware if necessary to resolve deficiencies.

a. Install updates only after receiving Commissioner's written authorization.

3. Perform warranty service during normal business hours and commence within 8 hours of City of New York's warranty service request.
4. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DIRECT DIGITAL CONTROL SYSTEM MANUFACTURERS

A. Sole Source Manufacturer: Honeywell JACE Web-8000 controller with Niagra 4 software.

1. No Substitutions Permitted.

2.2 DIRECT DIGITAL CONTROL SYSTEM DESCRIPTION

A. Microprocessor-based monitoring and control including analog/digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices to achieve a set of predefined conditions.

1. Direct Digital Control system consisting of high-speed, peer-to-peer network of distributed Direct Digital Control controllers, other network devices, operator interfaces, and software.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 WEB ACCESS

A. Direct Digital Control system to be web based web compatible.

1. Web-Based Access to Direct Digital Control System:

a. Direct Digital Control system software based on server thin-client architecture, designed around open standards of web technology. Direct Digital Control system server accessed using a web browser over Direct Digital Control system network, using City of New York's LAN, and remotely over Internet through City of New York's LAN.
b. Intent of thin-client architecture is to provide operators complete access to Direct Digital Control system via a web browser. No special software other than a web browser is required to access graphics, point displays, and trends; to configure trends, points, and controllers; and to edit programming.
c. Password-protected web access.

2. Web-Compatible Access to Direct Digital Control System:

a. Workstation and server to perform overall system supervision and configuration, graphical user interface, management report generation, and alarm annunciation.
b. Direct Digital Control system to support web browser access to building data. Operator using a standard web browser is able to access control graphics and change adjustable set points.
c. Password-protected web access.

2.4 PERFORMANCE REQUIREMENTS

A. ASME Compliance:

1. Direct Digital Control system for monitoring and controlling of HVAC systems.

B. Delivery of selected control devices to equipment and systems manufacturers for factory installation and to HVAC systems installers for field installation.

C. Engage a Controls Specialist to design Direct Digital Control system to satisfy requirements indicated.

1. System Performance Objectives:

a. Direct Digital Control system manages HVAC systems.
b. Direct Digital Control system operates HVAC systems to achieve optimum operating costs while using least possible energy and maintaining specified performance.
c. Direct Digital Control system responds to power failures, HVAC equipment failures, and adverse and emergency conditions encountered through connected I/O points.
d. Direct Digital Control system operates while unattended by an operator and through operator interaction.
e. Direct Digital Control system records trends and transactions of events and produces report information such as performance, energy, occupancies, and equipment operation.

D. Surface-Burning Characteristics: Products installed in ducts, equipment, and return-air paths complying with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

E. Direct Digital Control System Speed:

1. Response Time of Connected I/O:

a. Update AI point values connected to Direct Digital Control system at least every five seconds for use by Direct Digital Control controllers. Points used globally to also comply with this requirement.
b. Update BI point values connected to Direct Digital Control system at least every five seconds for use by Direct Digital Control controllers. Points used globally to also comply with this requirement.
c. AO points connected to Direct Digital Control system to begin to respond to controller output commands within two second(s). Global commands to also comply with this requirement.
d. BO point values connected to Direct Digital Control system to respond to controller output commands within two second(s). Global commands to also comply with this requirement.

2. Display of Connected I/O:

a. Update and display analog point COV connected to Direct Digital Control system at least every 10 seconds for use by operator.
b. Update and display binary point COV connected to Direct Digital Control system at least every 10 seconds for use by operator.
c. Update and display alarms of analog and digital points connected to Direct Digital Control system within 45 seconds of activation or change of state.
d. Update graphic display refresh within eight seconds.
e. Point change of values and alarms displayed from workstation to workstation when multiple operators are viewing from multiple workstations to not exceed graphic refresh rate indicated.

F. Network Bandwidth: Design each network of Direct Digital Control system to include spare bandwidth with Direct Digital Control system operating under normal and heavy load conditions indicated. Calculate bandwidth usage, and apply a safety factor to ensure that requirement is satisfied when subjected to testing under worst case conditions. Minimum spare bandwidth as follows:

1. Level 1 Networks: 20.
2. Level 2 Networks: 20.
3. Level 3 Networks: 10.

G. Direct Digital Control System Data Storage:

1. Include capability to archive not less than 24 consecutive months of historical data for all I/O points connected to system, including alarms, event histories, transaction logs, trends, and other information indicated.
2. Local Storage:

a. Provide server with data storage indicated. Server(s) to use IT industry standard database platforms and be capable of functions described in "Direct Digital Control Data Access" Paragraph.

3. Cloud Storage:

a. Provide application-based and web browser interfaces to configure, upload, download, and manage data and to service plan with storage adequate to store all data for term indicated. Cloud storage uses IT industry standard database platforms and is capable of functions described in "Direct Digital Control Data Access" Paragraph.

H. Direct Digital Control Data Access:

1. When logged into the system, operator able to also interact with any Direct Digital Control controllers connected to Direct Digital Control system as required for functional operation of Direct Digital Control system.
2. Use for application configuration; for archiving, reporting, and trending of data; for operator transaction archiving and reporting; for network information management; for alarm annunciation; and for operator interface tasks and controls application management.

I. Future Expandability:

1. Direct Digital Control system size is expandable to an ultimate capacity of at least 1.25 times total I/O points indicated.
2. Design and install system networks to achieve ultimate capacity with only addition of Direct Digital Control controllers, I/O, and associated wiring and cable. Design and install initial network infrastructure to support ultimate capacity without having to remove and replace portions of network installation.
3. Operator interfaces installed initially do not require hardware and software additions and revisions for system when operating at ultimate capacity.

J. Input Point Values Displayed Accuracy: Meet following end-to-end overall system accuracy, including errors associated with meter, sensor, transmitter, lead wire or cable, and analog to digital conversion.

1. Energy:

    a. Thermal: Within 5 percent of reading.
    b. Requirements indicated on Drawings for meters not supplied by utility.

2. Flow:

    a. Air: Within 5 percent of design flow rate.
    b. Air (Terminal Units): Within 10 percent of design flow rate.
    c. Natural Gas: Within 5 percent of design flow rate.
    d. Water: Within 5 percent of design flow rate.
    e. Steam: Within 5 percent of design flow rate.

3. Gas:

    a. Carbon Dioxide: Within 50 ppm.
    b. Carbon Monoxide: Within 5 percent of reading.
    c. Oxygen: Within 5 percent of reading.
    d. Refrigerant: Within 5 percent of reading.
    e. VOCs: Within 5 percent of reading.

4. Moisture (Relative Humidity):

    a. Air: Within 5 percent RH.
    b. Space: Within 5 percent RH.
    c. Outdoor: Within 5 percent RH.

5. Level: Within 5 percent of reading.
6. Pressure:

    a. Air, Ducts and Equipment: 1 percent of instrument range.
    b. Space: Within 1 percent of instrument range.
    c. Water: Within 1 percent of instrument range.
    d. Steam: Within 1 percent of instrument range.

7. Speed: Within 10 percent of reading.
8. Temperature, Dew Point:

a. Air: Within 1 deg F.
b. Space: Within 1 deg F.
c. Outdoor: Within 3 deg F.

9. Temperature, Dry Bulb:

a. Air: Within 1 deg F.
b. Space: Within 1 deg F.
c. Outdoor: Within 2 deg F.
d. Chilled Water: Within 1 deg F.
e. Condenser Water: Within 1 deg F.
f. Heating Hot Water: Within 1 deg F.
g. Temperature Difference: Within 0.1 deg F.
h. Other Temperatures Not Indicated: Within 1 deg F .

10. Temperature, Wet Bulb:

a. Air: Within 1 deg F.
b. Space: Within 1 deg F.
c. Outdoor: Within 2 deg F.

11. Vibration: Within 5 percent of reading.

K. Precision of I/O Reported Values: Values reported in database and displayed to have following precision:

1. Current:

a. Milliamperes: Nearest 1/100th of a milliampere.
b. Amperes: Nearest 1/10th of an ampere up to 100 A; nearest ampere for 100 A and more.

2. Energy:

a. Electric Power:

1) Rate (Watts): Nearest 1/10th of a watt through 1000 W.
2) Rate (Kilowatts): Nearest 1/10th of a kilowatt through 1000 kW; nearest kilowatt above 1000 kW.
3) Usage (Kilowatt-Hours): Nearest kilowatt through 10,000 kW; nearest 10 kW between 10,000 and 100,000 kW; nearest 100 kW for above 100,000 kW.

b. Fuel Oil (Usage): For gallons, nearest 1/10th of a gallon up to 100 gal.; nearest gallon for above 100 gal..
c. Natural Gas (Usage): Nearest 1/10th of a unit (cubic feet, MCF, therm) up to 100 units; nearest unit for above 100 units.
d. Thermal, Rate:

1) Heating: For British thermal units per hour, nearest British thermal unit per hour up to 1000 Btu/h; nearest 10 Btu/h between 1000 and 10,000 Btu/h; nearest 100 Btu/h for above 10,000 Btu/h. For MBh, round to nearest MBh up to 1000 MBh; nearest 10 MBh between 1000 and 10,000 MBh; nearest 100 MBh above 10,000 MBh.
2) Cooling: For tons, nearest ton up to 1000 tons; nearest 10 tons between 1000 and 10,000 tons; nearest 100 tons above 10,000 tons.

e. Thermal, Usage:

1) Heating: For British thermal unit, nearest British thermal unit up to 1000 Btu; nearest 10 Btu between 1000 and 10,000 Btu; nearest 100 Btu for above 10,000 Btu. For MBtu, round to nearest MBtu up to 1000 MBtu; nearest 10 MBtu between 1000 and 10,000 MBtu; nearest 100 MBtu above 10,000 MBtu.
2) Cooling: For ton-hours, nearest ton-hours up to 1000 ton-hours; nearest 10 ton-hours between 1000 and 10,000 ton-hours; nearest 100 tons above 10,000 tons.

3. Flow:

a. Air: Nearest 1/10th of a cubic feet per minute through 100 cfm; nearest cubic feet per minute between 100 and 1000 cfm; nearest 10 cfm between 1000 and 10,000 cfm; nearest 100 cfm above 10,000 cfm.
b. Fuel Oil: Nearest 1/10th of a gallon per minute through 100 gpm; nearest gallon per minute between 100 and 1000 gpm.
c. Natural Gas:Nearest 1/10th of a cubic feet per hour through 100 cfh; nearest cubic feet per hour between 100 and 1000 cfh; nearest 10 cfh between 1000 and 10,000 cfh; nearest 100 cfh above 10,000 cfh.
d. Water: Nearest 1/10th of a gallon per minute through 100 gpm; nearest gallon per minute between 100 and 1000 gpm; nearest 10 gpm between 1000 and 10,000 gpm; nearest 100 gpm above 10,000 gpm.
e. Steam: Nearest 1/10th of a pound per hour through 100 lb/h; nearest pound per hour between 100 and 1000 lb/h; nearest 10 lb/h above 1000 lb/h.

4. Gas:

a. Carbon Dioxide (ppm): Nearest ppm.
b. Carbon Monoxide (ppm): Nearest ppm.
c. Oxygen (Percentage): Nearest 1/10th of 1 percent.
d. Refrigerant (ppm): Nearest ppm.
e. Volatile Organic Compounds (ppm): Nearest ppm

5. Moisture (Relative Humidity):

a. Relative Humidity (Percentage): Nearest 1 percent.

6. Level: Nearest 1/100th of an inch through 10 inches; nearest 1/10 of an inch between 10 and 100 inches; nearest inch above 100 inches.
7. Speed:

a. Rotation (rpm): Nearest 1 rpm.

b. Velocity: Nearest 1/10th of feet per minute through 100 fpm; nearest feet per minute between 100 and 1000 fpm; nearest 10 fpm above 1000 fpm.

8. Position, Dampers and Valves (Percentage Open): Nearest 1 percent.
9. Pressure:

a. Air, Ducts and Equipment: Nearest 1/10th of an inch water column (Nearest pascal up to 1000 Pa; nearest 10 Pa above 1000 Pa)
b. Space: Nearest 1/100th of an inch water column (Nearest 1/10th of a pascal).
c. Steam: Nearest 1/10th of pounds per square inch gauge through 100 psig; nearest pounds per square inch gauge above 100 psig.
d. Water: Nearest 1/10 of a pound per square inch gauge through 100 psig; nearest pound per square inch gauge above 100 psig.

10. Temperature:

a. Air, Ducts and Equipment: Nearest 1/10th of a degree.
b. Outdoor: Nearest degree.
c. Space: Nearest 1/10th of a degree.
d. Chilled Water: Nearest 1/10th of a degree.
e. Condenser Water: Nearest 1/10th of a degree.
f. Heating Hot Water: Nearest degree.
g. Heat Recovery Runaround: Nearest 1/10th of a degree.
h. Steam: Nearest degree.

11. Vibration: Nearest 1/10th of an inch per second.
12. Voltage: Nearest 1/10 V up to 100 V; nearest volt above 100 V.

L. Control Stability: Control variables indicated within the following limits:

1. Flow:

a. Air, Ducts and Equipment, except Terminal Units: Within 5 percent of design flow rate.
b. Air, Terminal Units: Within 10 percent of design flow rate.
c. Water: Within 2 percent of design flow rate.
d. Steam: Within 5 percent of design flow rate.

2. Gas:

a. Carbon Dioxide: Within 50 ppm.
b. Carbon Monoxide: Within 5 percent of reading.
c. Oxygen: Within 5 percent of reading.

3. Moisture (Relative Humidity):

a. Air: Within 5 percent RH.
b. Space: Within 5 percent RH.
c. Outdoor: Within 5 percent RH.

4. Level: Within 5 percent of reading.

5. Pressure:

    a. Air, Ducts and Equipment: 1 percent of instrument range.
    b. Space: Within 1 percent of instrument range.
    c. Water: Within 1 percent of instrument range.
    d. Steam: Within 1 percent of instrument range.

6. Temperature, Dew Point:

    a. Air: Within 1 deg F.
    b. Space: Within 1 deg F.

7. Temperature, Dry Bulb:

    a. Air: Within 2 deg F.
    b. Space: Within 2 deg F.
    c. Chilled Water: Within 1 deg F.
    d. Condenser Water: Within 1 deg F.
    e. Heating Hot Water: Within 2 deg F .
    f. Energy Recovery Runaround Liquid: Within 1 deg F .

8. Temperature, Wet Bulb:

    a. Air: Within 1 deg F.
    b. Space: Within 1 deg F.

M. Environmental Conditions for Controllers, Gateways, and Routers:

1. Products to operate without performance degradation under ambient environmental temperature, pressure, and humidity conditions encountered for installed location.

    a. If product alone cannot comply with requirement, install product in a protective enclosure that is isolated and protected from conditions impacting performance. Enclosure to be internally insulated, electrically heated, cooled, and ventilated as required by product and application.

2. Protect products with enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. House products not available with integral enclosures complying with requirements indicated in protective secondary enclosures. Installed location dictates the following NEMA 250 enclosure requirements:

    a. Outdoors, Protected: Type 2.
    b. Outdoors, Unprotected: Type 4.
    c. Indoors, Heated with Filtered Ventilation: Type 1.
    d. Indoors, Heated with Non-Filtered Ventilation: Type 12.
    e. Indoors, Heated and Air-Conditioned: Type 1.
    f. Mechanical Equipment Rooms:

        1) Chiller and Boiler Rooms: Type 12.
        2) Air-Moving Equipment Rooms: Type 1.

g. Localized Areas Exposed to Washdown: Type 4X.
h. Within Duct Systems and Air-Moving Equipment Not Exposed to Possible Condensation: Type 12.
i. Within Duct Systems and Air-Moving Equipment Exposed to Possible Condensation: Type 4X.
j. Hazardous Locations: Explosion-proof rating for condition.

N. Environmental Conditions for Instruments and Actuators:

1. Instruments and actuators to operate without performance degradation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified and encountered for installed location.

a. If instruments and actuators alone cannot comply with requirement, install instruments and actuators in protective enclosures that are isolated and protected from conditions impacting performance. Enclosure is internally insulated, electrically heated, cooled, and ventilated as required by instrument and application.

2. Protect instruments, actuators, and accessories with enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. House instruments and actuators not available with integral enclosures complying with requirements indicated in protective secondary enclosures. Installed location is to dictate the following NEMA 250 enclosure requirements:

a. Outdoors, Protected: Type 12.
b. Outdoors, Unprotected: Type 4X.
c. Indoors, Heated with Filtered Ventilation: Type 1.
d. Indoors, Heated with Non-Filtered Ventilation: Type 12.
e. Indoors, Heated and Air-conditioned: Type 1.
f. Mechanical Equipment Rooms:

1) Chiller and Boiler Rooms: Type 12.
2) Air-Moving Equipment Rooms: Type 1.

g. Localized Areas Exposed to Washdown: Type 4X.
h. Within Duct Systems and Air-Moving Equipment Not Exposed to Possible Condensation: Type 12.
i. Within Duct Systems and Air-Moving Equipment Exposed to Possible Condensation: Type 4X.
j. Hazardous Locations: Explosion-proof rating for condition.

O. Direct Digital Control System Reliability:

1. Design, install, and configure Direct Digital Control controllers, to yield a MTBF of at least 40,000 hours, based on a confidence level of at least 90 percent. MTBF value includes any failure for any reason to any part of products indicated.
2. If required to comply with MTBF indicated, include Direct Digital Control system and product redundancy to maintain Direct Digital Control system, and associated systems and equipment being controlled, operational, and under automatic control.

3. See Drawings for critical systems and equipment that require a higher degree of Direct Digital Control system redundancy than MTBF indicated.

P. Electric Power Quality:

1. Power-Line Surges:

a. Protect susceptible Direct Digital Control system products connected to ac power circuits from power-line surges to comply with requirements of IEEE C62.41.1 and IEEE C62.41.2.
b. Do not use fuses for surge protection.
c. Test protection in the normal mode and in the common mode, using the following two waveforms:

1) 10-by-1000-microsecond waveform with a peak voltage of 1500 V and a peak current of 60 A.
2) 8-by-20-microssecond waveform with a peak voltage of 1000 V and a peak current of 500 A.

2. Power Conditioning:

a. Protect susceptible Direct Digital Control system products connected to ac power circuits from irregularities and noise rejection. Characteristics of power-line conditioner are as follows:

1) At 85 percent load, output voltage to not deviate by more than plus or minus 1 percent of nominal when input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.
2) During load changes from zero to full load, output voltage to not deviate by more than 3 percent of nominal.
3) Accomplish full correction of load switching disturbances within five cycles, and 95 percent correction within two cycles of onset of disturbance.
4) Total harmonic distortion to not exceed 2 percent at full load.

3. Ground Fault: Protect products from ground fault by providing suitable grounding. Products to not fail due to ground fault condition.

Q. Backup Power Source:

1. Serve Direct Digital Control system products that control HVAC systems and equipment served by a backup power source also from a backup power source.

R. UPS:

1. Direct Digital Control system products powered by UPS units are to include the following:

a. Servers.
b. Gateways.
c. Direct Digital Control controllers, except application-specific controllers.
d. Desktop workstations.

2. Direct Digital Control system instruments powered by UPS units are to include the following:

a. Instruments: Where indicated on Drawings; where associated with the following systems controlled by Direct Digital Control system:
b. Damper Actuators: Where indicated on Drawings; where associated with the following systems controlled by Direct Digital Control system:
c. Valve Actuators: Where indicated on Drawings; where associated with the following systems controlled by Direct Digital Control system:

S. Continuity of Operation after Electric Power Interruption:

1. Equipment and associated factory-installed controls, field-installed controls, electrical equipment, and power supply connected to building normal and backup power systems are to automatically return equipment and associated controls to operating state occurring immediately before loss of normal power, without need for manual intervention by operator when power is restored either through backup power source or through normal power if restored before backup power is brought online.

2.5 PANEL-MOUNTED, MANUAL OVERRIDE SWITCHES

A. Manual Override of Control Dampers:

1. Include panel-mounted, two-position, selector switch for each automatic control damper being controlled by Direct Digital Control controller.
2. Label each switch with damper designation served by switch.
3. Label switch positions to indicate either "Manual" or "Auto" control signal to damper.
4. With switch in "Auto" position, control signal to damper actuator with control loop output signal from Direct Digital Control controller.
5. With switch in "Manual" position, control signal to damper actuator at panel with either an integral or a separate switch to include local control.

    a. For Binary Control Dampers: Manual two-position switch with "Close" and "Open" switch positions indicated. With switch in "Close" position, close damper. With switch in "Open" position, open damper.
    b. For Analog Control Dampers: A gradual switch with "Close" and "Open" switch limits indicated. Operator switches knob to adjust damper to any position from close to open.

6. Direct Digital Control controller to monitor and report position of each manual override selector switch. With switch placed in "manual" position, Direct Digital Control controller to signal an override condition to alert operator that damper is under manual, not automatic, control.
7. Configure manual override switches to allow operator to manually operate damper while at panel without Direct Digital Control controller installed and operational.
8. Terminal equipment including VAV units, do not require manual override unless otherwise indicated by sequence of operation.

B. Manual Override of Control Valves:

1. Include panel-mounted, two-position, selector switch for each automatic control valve being controlled by Direct Digital Control controller.
2. Label each switch with valve designation served by switch.
3. Label switch positions to indicate either "Manual" or "Auto" control signal to valve.

4. With switch in "Auto" position, control signal to valve actuator with a control loop output signal from Direct Digital Control controller.
5. With switch in "Manual" position, control signal to valve actuator at panel with either an integral or a separate switch to include local control.

    a. For Binary Control Valves: Manual two-position switch with "Close" and "Open" switch positions indicated. With switch in "Close" position, close valve. With switch in "Open" position, open valve.
    b. For Analog Control Valves: A gradual switch with "Open" and "Close" switch limits indicated. Operator rotates switch knob to adjust valve to any position from close to open.

6. Direct Digital Control controller to monitor and report position of each manual override selector switch. With switch placed in "manual" position, Direct Digital Control controller to signal an override condition to alert operator that valve is under manual, not automatic, control.
7. Configure manual override switches to allow operator to manually operate valve while at panel without Direct Digital Control controller installed and operational.
8. Terminal equipment including VAV units, do not require manual override unless otherwise indicated by sequence of operation.

2.6 SYSTEM ARCHITECTURE

A. System architecture consisting of no more than three levels of LANs.

1. Level 2 LAN: Connect network controllers and operator workstations.
2. Level 1 or Level 2 LAN: Connect programmable application controllers to other programmable application controllers and to network controllers.
3. Level 2 or Level 3 LAN: Connect application-specific controllers to programmable application controllers and to network controllers.

B. Minimum Data Transfer and Communication Speed:

1. LAN Connecting Operator Workstations and Network Controllers: 100 Mbps.
2. LAN Connecting Programmable Application Controllers: 1000 kbps.
3. LAN Connecting Application-Specific Controllers: 115,000 bps.

C. Provide dedicated and separated Direct Digital Control system LANs that are not shared with other building systems and tenant data and communication networks.

D. Provide modular system architecture with inherent ability to expand to not less than two times system size indicated with no impact to performance indicated.

E. Configure architecture to minimize need to remove and replace existing network equipment for system expansion.

F. Make number of LANs and associated communication transparent to operator. Configure all I/O points residing on any LAN to be capable of global sharing between all system LANs.

G. Design system to eliminate dependence on any single device for system alarm reporting and control execution. Design each controller to operate independently by performing own control, alarm management, and historical data collection.

H. Special Network Architecture Requirements:

1. Air-Handling Systems: For control applications of an air-handling system that consists of air-handling unit(s) and VAV terminal units, include a dedicated LAN of application-specific controllers serving VAV terminal units connected directly to controller that is controlling air-handling-system air-handling unit(s). Basically, create Direct Digital Control system LAN that aligns with air-handling system being controlled.

2.7 DIRECT DIGITAL CONTROL SYSTEM OPERATOR INTERFACES

A. Operator Means of System Access: Operator able to access entire Direct Digital Control system through any of multiple means including, but not limited to, the following:

1. Desktop and portable workstation with hardwired connection through LAN port.
2. Portable operator terminal with hardwired connection through LAN port.
3. Portable operator workstation with wireless connection through LAN router.
4. Mobile device and application with secured wireless connection through LAN router or cellular data service.
5. Remote connection through web access.

B. Make access to system, regardless of operator means used, transparent to operator.

C. Network Ports: For hardwired connection of desktop or portable workstation. Network port easily accessible, properly protected, clearly labeled, and installed at the following locations:

1. Each mechanical equipment room.
2. Each boiler room.
3. Each chiller room.
4. Each outdoor on-grade yard and elevated platform with equipment connected to Direct Digital Control system.
5. Each different roof level with roof-mounted equipment connected to Direct Digital Control system.
6. Security system command center.
7. Fire-alarm system command center.

D. Desktop Workstations:

1. Connect desktop workstation(s) to Direct Digital Control system Level 1 LAN through a communications port directly on LAN or through a communications port on a Direct Digital Control controller.
2. Able to communicate with any device located on any Direct Digital Control system LAN.

E. Portable Workstations:

1. Connect portable workstation(s) to Direct Digital Control system Level 1 LAN through a communications port directly on LAN or through a communications port on a Direct Digital Control controller.
2. Able to communicate with any device located on any Direct Digital Control system LAN.
3. Connect to Direct Digital Control system Level 2 Level 3 LAN through a communications port on an application-specific controller, or a room temperature sensor connected to an application-specific controller.
4. Connect to system through a wireless router connected to Level 1 LAN.
5. Connect to system through a cellular broadband data service.
6. Portable workstation able to communicate with any device connected to any system LAN regardless of point of physical connection to system.
7. Monitor, program, schedule, adjust set points, and report capabilities of I/O connected anywhere in system.
8. Have dynamic graphic displays that are identical to desktop workstations.

F. POT:

1. Connect Direct Digital Control controller through a communications port local to controller.
2. Able to communicate with any Direct Digital Control system controller that is directly connected or with LAN or connected to Direct Digital Control system.

G. Mobile Device (Tablet and Smart Phone):

1. Connect City of New York-furnished mobile devices to system through a wireless router connected to LAN.
2. Able to communicate with any Direct Digital Control controller connected to Direct Digital Control system using dedicated application secure web access.

H. Critical Alarm Reporting:

1. Send operator-selected critical alarms to notify operator of critical alarms that require immediate attention.
2. Send alarm notification to multiple recipients that are assigned for each alarm.
3. Notify recipients by any or all means, including email, text message, and prerecorded phone message to mobile and landline phone numbers.

I. Simultaneous Operator Use: Capable of accommodating up to five simultaneous operators that are accessing Direct Digital Control system through any of operator interfaces indicated.

2.8 NETWORKS

A. Acceptable networks for connecting workstations, mobile devices, and network controllers include the following:

1. ATA 878.1, ARCNET.
2. CTA-709.1-D.
3. IP.
4. ISO/IEC/IEEE 8802-3, Ethernet.

B. Acceptable networks for connecting programmable application controllers include the following:

1. ATA 878.1, ARCNET.
2. CTA-709.1-D.
3. IP.
4. ISO/IEC/IEEE 8802-3, Ethernet.

C. Acceptable networks for connecting application-specific controllers include the following:

1. ATA 878.1, ARCNET.
2. CTA-709.1-D.
3. TIA 485-A.
4. IP.
5. ISO/IEC/IEEE 8802-3, Ethernet.

2.9 NETWORK COMMUNICATION PROTOCOL

A. Use network communication protocol(s) that are open to City of New York and available to other companies for use in making future modifications to Direct Digital Control system.

B. ASHRAE 135 Protocol:

1. Use ASHRAE 135 communication protocol as sole and native protocol used throughout entire Direct Digital Control system.
2. Direct Digital Control system to not require use of gateways except to integrate HVAC equipment and other building systems and equipment; not required to use ASHRAE 135 communication protocol.
3. If used, gateways to connect to Direct Digital Control system using ASHRAE 135 communication protocol and Project object properties and read/write services indicated by interoperability schedule.
4. Use operator workstations, controllers, and other network devices that are tested and listed by BTL.

C. CTA-709.1-D Protocol:

1. Open implementation of LonWorks technology using CTA 709.1-D communication protocol and using LonMark SNVTs as defined in LonMark SNVT list exclusively for communication throughout Direct Digital Control system.
2. Use LNS for all network management including addressing and binding of network variables.

    a. Submit final LNS database with Project closeout submittals.
    b. All devices are to be online and commissioned into LNS database.

3. Use CTA-709.1-D protocol for all connected device. Install so SCPT output from any node on network can be bound to any other node in the domain.

D. Industry Standard Protocols:

1. Use any one or a combination of the following industry standard protocols for network communication while complying with other Direct Digital Control system requirements indicated:

a. ASHRAE 135.
b. CTA-709.1-D.
c. Modbus Application Protocol Specification V1.1b3.

2. Operator workstations and network controllers are to communicate through ASHRAE 135 CTA-709.1-D protocol.
3. Provide portions of Direct Digital Control system networks using ASHRAE 135 communication protocol as an open implementation of network devices complying with ASHRAE 135. Use network devices that are tested and listed by BTL.
4. Provide portions of Direct Digital Control system networks using CTA-709.1-D communication protocol as an open implementation of LonWorks technology using CTA-709.1-D communication protocol and using LonMark SNVTs as defined in LonMark SNVT list exclusively for Direct Digital Control system.
5. Provide portions of Direct Digital Control system networks using Modbus Application Protocol Specification V1.1b3 communication protocol as an open implementation of network devices and technology complying with Modbus Application Protocol Specification V1.1b3.
6. Use gateways to connect networks and network devices with different protocols.

2.10 DIRECT DIGITAL CONTROL SYSTEM WIRELESS NETWORKS

A. Use Zigbee an open industry standard and technology used by multiple Direct Digital Control system manufacturers technology to create a wireless mesh network to provide wireless connectivity for network devices at multiple system levels including communications from programmable application controllers and application-specific controllers to temperature sensors and from network controllers to programmable application controllers and application-specific controllers.

B. Design and install wireless networks to comply with Direct Digital Control system performance requirements indicated using wireless network devices that can co-exist on same network with hardwired devices.

C. Provide hardwired controllers capable of retrofitting to wireless devices with no special software.

D. Provide a wireless coordinator for wireless interface between programmable application controllers, application-specific controllers, and network controllers.

E. Wireless Coordinators:

1. Use for initiation and formation of each wireless mesh network.
2. Use direct-sequence spread spectrum RF technology.
3. Operate on 2.4 GHz ISM Band.
4. Comply with IEEE 802.15.4 for low-power, low duty-cycle RF transmitting systems.
5. FCC compliant to 47 CFR 15, Subpart B, Class A.
6. Operate as a bidirectional transceiver with sensors and routers to confirm and synchronize data transmission.
7. Capable of communication with sensors and routers up to a maximum distance of 250 ft. in line of sight.
8. Include visual indicators to provide diagnostic information required for operator verification of operation.

F. Wireless Routers:

1. Use wireless routers with any controller to provide a wireless interface to a network controller, through a wireless coordinator.
2. Use direct-sequence spread spectrum RF technology.
3. Operate on 2.4 GHz ISM Band.
4. Comply with IEEE 802.15.4 for low-power, low duty-cycle RF transmitting systems.
5. FCC compliant to 47 CFR 15, Subpart B, Class A.
6. Operate as a bidirectional transceiver with other mesh network devices to ensure network integrity.
7. Capable of communication with other mesh network devices at a maximum distance of 250 ft. in line of sight.
8. Include indication for use in commissioning and troubleshooting.

G. Wireless Temperature Sensors:

1. Wireless temperature sensors to sense and transmit room temperatures, temperature set point, room occupancy notification, and low battery condition to an associated router.
2. Use direct-sequence spread spectrum RF technology.
3. Operate on 2.4 GHz ISM Band.
4. Comply with IEEE 802.15.4 for low-power, low duty-cycle RF transmitting systems.
5. FCC compliant to 47 CFR 15, Subpart B, Class A.
6. Include set-point adjustment between 55 to 85 deg F.
7. Configure so multiple sensors can report to a router connected to Direct Digital Control controller for averaging or high and low selection.

H. One-to-One Wireless Network Receivers:

1. One-to-one wireless receivers receive wireless RF signals containing temperature data from multiple wireless room temperature sensors and communicate information to programmable application controllers or application-specific controllers.

    a. Use direct-sequence spread spectrum RF technology.
    b. Operate on 2.4 GHz ISM Band.
    c. Comply with IEEE 802.15.4 for low-power, low duty-cycle RF transmitting systems.
    d. FCC compliant to 47 CFR 15, Subpart B, Class A.
    e. Operate as a bidirectional transceiver with sensors to confirm and synchronize data transmission.
    f. Capable of communication up to a distance of 200 ft..
    g. Include visual indication of the following:

        1) Power.
        2) Receiver activity.
        3) Wireless RF transmission from wireless sensors.
        4) No transmission, weak signal, adequate signal, or excellent signal.

I. One-to-One Wireless Network Sensors:

1. One-to-one wireless sensors sense and report room temperatures to one-to-one receiver.

a. Use direct-sequence spread spectrum RF technology.
b. Operate on 2.4 GHz ISM Band.
c. Comply with IEEE 802.15.4 for low-power, low duty-cycle RF transmitting systems.
d. FCC compliant to 47 CFR 15, Subpart B, Class A.
e. Include set-point adjustment between 55 to 85 deg F.

2.11 DESKTOP WORKSTATIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dell Inc.
2. HP.
3. Lenovo.
4. Or approved equal.

B. Description: A tower or all-in-one computer designed for normal use at a single, semi-permanent location.

C. Performance Requirements:

1. May dictate equipment exceeding minimum requirements indicated.
2. ENERGY STAR compliant.

D. Personal Computer:

1. Minimum Processor Speed: 4.2.
2. RAM:

a. Capacity: 32 GB.
b. Speed and Type: 1333 MHz, .

3. Hard Drive:

a. Media: Solid state.
b. Number of Hard Drives: Two.
c. Capacity: 500GB.

4. At least four expansion slots of 64 bit.
5. Video Card:

a. Resolution: 1920 by 1200 pixels.
b. RAM:2 GB.
c. Controller Speed: 32GHz.

6. Sound Card:

a. At least 128 voice wavetable synthesis.
b. Capable of delivering three-dimensional sound effects.

c. High-resolution, 16-bit stereo digital audio recording and playback with user-selectable sample rates up to 48,000 Hz.

7. Network Interface Card: Include card with connection, as applicable.

a. 10-100-1000 base TX Ethernet with RJ-45 connector port.
b. 100 base FX Ethernet with SC or ST port.

E. Wireless Ethernet, 802.11 ac:

1. Optical Modem: Full duplex link for connection to optical fiber cable provided.
2. I/O Ports:

a. Two USB 3.0 ports on front panel, six on back panel, and three internal on motherboard.
b. One serial port.
c. One parallel port.
d. Two PS/2 ports.
e. One RJ-45.
f. One stereo line-in and headphone/line-out on back panel.
g. One microphone and headphone connector on front panel.
h. One IEEE 1394 on front and back panel with PCI-e card.
i. One ESATA port on back panel.

3. Battery: Life of at least three years to maintain system clock/calendar and ROM, at a minimum.

F. Keyboard:

1. 101 enhanced keyboard.
2. Full upper- and lowercase ASCII keyset, numeric keypad, dedicated cursor control keypad, and 12 programmable function keys.
3. Wireless operation within up to 72 inches in front of workstation.

G. Pointing Device:

1. Two- or three-button mouse.
2. Wireless operation within up to 72 inches in front of workstation.

H. Flat Panel Display Monitor:

1. Display:

a. Color display with 27 inches diagonal viewable area.
b. Digital analog input signal.
c. Aspect Ratio: 16 to 9.
d. Antiglare display.
e. Response Time: 5 ms.
f. Dynamic Contrast Ratio: 50000 to 1.
g. Brightness: 250 cd/sq. m.
h. Tilt adjustable base.
i. ENERGY STAR compliant.

j. Resolution: 1920 by 1080 pixels at 60 Hz with pixel size of 0.277 mm or smaller.
k. Number of Displays: One .

I. Speakers:

1. Two, with individual controls for volume, bass and treble.
2. Signal to Noise Ratio: At least 65 dB.
3. Power: At least 4 W per speaker/channel.
4. Magnetic shielding to prevent distortion on the video monitor.

J. I/O Cabling: Include applicable cabling to connect I/O devices.

2.12 SERVERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dell Inc.
2. HP.
3. Lenovo.
4. Or approved equal.

B. Description: x86-based permanently installed computer used for client-server computing.

C. Mounting: Tower able to be rack mounted.

D. Power: Dual power supply, minimum 300 W.

E. Performance Requirements:

1. Performance requirements may dictate equipment exceeding minimum requirements indicated.
2. ENERGY STAR compliant.
3. Minimum Processor Speed: 2.2 GHz.
4. RAM:

a. Capacity: 32 GB.
b. Expandable Capacity: 32 GB.

5. Redundant Array of Independent Discs: Zero configuration.
6. Drive Bays: Eight at 2.5 inches or eight at 3.5 inches.
7. Hard-Drive Storage: Two drives each with 500 GB storage and nominal rotational speed of 7200 rpm.
8. Network Interface: Dual-port gigabit Ethernet.
9. DVD +RW drive.
10. Color, flat-screen display with 27 inches diagonal viewable area.
11. Keyboard and mouse.
12. Next-day on-site warranty for two -year period following Substantial Completion.

F. Servers are to include the following:

1. Full-feature backup server (server and backup minimum requirement).

2. Software licenses.
3. Cable installation between server(s) and network.

G. Web Server:

1. If required to be separate, include web server hardware and software to match, except backup server is not required.
2. Firewalls between server web and networks.
3. Password protection for access to server from web server.
4. Cable installation between the server(s) and building Ethernet network.

H. Power each server through a dedicated UPS unit.

2.13 PRINTERS

A. Black and White Laser Printer:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brother International Corporation.
   b. Epson America, Inc.
   c. Hewlett-Packard Company.
   d. Or approved equal.

2. 1200 by 1200 dots per inch resolution.
3. First sheet printed within 10 seconds.
4. Five page per minute rated print speed at best quality mode.
5. Print buffer with at least 64 MB of RAM, expandable to at least 288 MBs.
6. Complies with ENERGY STAR requirements.
7. Capable of handling letter- and legal-size paper and overhead transparencies.
8. Two paper trays; one tray with 500 sheet capacity, and one tray with 500 sheet capacity.
9. At least 2,500 page toner/cartridge capacity.

B. Color Laser Printer:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brother International Corporation.
   b. Epson America, Inc.
   c. Hewlett-Packard Company.
   d. Or approved equal.

2. 1200 by 1200 dots per inch resolution black and white, 1200 by 1200 dots per inch resolution black and white and color.
3. First sheet printed within 10 seconds.
4. Five page per minute rated print speed at best quality mode.
5. Print buffer with at least 512 MB of RAM, expandable to at least one GB.
6. Complies with ENERGY STAR requirements.
7. Capable of handling letter- and legal-size paper and overhead transparencies.

8. Two paper trays; one tray with 500 sheet capacity, and one tray with 500 sheet capacity.
9. Two-sided printing.
10. At least 2,500page toner/cartridge capacity.

C. Color Inkjet Printer:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brother International Corporation.
   b. Epson America, Inc.
   c. Hewlett-Packard Company.
   d. Or approved equal.

2. Inkjet technology with true four-color printing (black, cyan, magenta, and yellow).
3. Print quality of 1200 by 600 dots per inch with black on inkjet paper and 4800 by 1200 dots per inch color printing on premium photo paper.
4. Rated speed of Five pages per minute printing black and white in normal mode and five pages per minute printing color in normal mode.
5. Two paper trays; one tray with 500 sheet capacity, and one tray with 500 sheet capacity.
6. Capable of handling letter- and legal-size paper and overhead transparencies.
7. 64 MB of RAM.
8. Duplex printing (printing on both sides of paper).

2.14 SYSTEM SOFTWARE

A. System Software Minimum Requirements:

1. Real-time multitasking and multiuser 64-bit operating system that allows concurrent multiple operator workstations operating and concurrent execution of multiple real-time programs and custom program development.
2. Operating system capable of operating DOS and Microsoft Windows applications.
3. Database management software to manage all data on an integrated and non-redundant basis. Additions and deletions to database are to be without detriment to existing data. Include cross linkages so no data required by a program can be deleted by an operator until that data have been deleted from respective programs.
4. Network communications software to manage and control multiple network communications to provide exchange of global information and execution of global programs.
5. Operator interface software to include day-to-day operator transaction processing, alarm and report handling, operator privilege level and data segregation control, custom programming, and online data modification capability.
6. Scheduling software to schedule centrally based time and event, temporary, and exception day programs.

B. Operator Interface Software:

1. Minimize operator instruction through use of English language prorating and English language point identification.
2. Minimize use of a typewriter-style keyboard through use of a pointing device similar to a mouse.

3. Make operator sign-off a manual operation or, if no keyboard or mouse activity takes place, an automatic sign-off.
4. Make automatic sign-off period programmable from one to 60 minutes in one-minute increments on a per operator basis.
5. Record operator sign-on and sign-off activity and send to printer.
6. Security Access:

    a. Use password control for operator access to Direct Digital Control system.
    b. Assign an alphanumeric password (field assignable) to each operator.
    c. Grant operators access to Direct Digital Control system by entry of proper password.
    d. Use same operator password regardless of which computer or other operator interface means are used.
    e. Automatically update additions or changes made to passwords.
    f. Assign each operator an access level to restrict access to data and functions the operator is cable of performing.
    g. Provide software with at least five access levels.
    h. Assign each menu item an access level so that a one-for-one correspondence between operator assigned access level(s) and menu item access level(s) is required to gain access to menu item.
    i. Display menu items to operator with those capable of access highlighted. Make menu and operator access level assignments online programmable and under password control.

7. Data Segregation:

    a. Include data segregation for control of specific data routed to a workstation, to an operator or to a specific output device, such as a printer.
    b. Include at least 32 segregation groups.
    c. Make segregation groups selectable such as "fire points," "fire points on second floor," "space temperature points," "HVAC points," and so on.
    d. Make points assignable to multiple segregation groups. Display and output of data to printer or monitor is to occur where there is a match of operator or peripheral segregation group assignment and point segregations.
    e. Make alarms displayed and printed at each peripheral to which segregation allows, but only those operators assigned to peripheral and having proper authorization level will be allowed to acknowledge alarms.
    f. Assign operators and peripherals to multiple segregation groups and make all assignments online programmable and under password control.

8. Operators able to perform commands including, but not limited to, the following:

    a. Start or stop selected equipment.
    b. Adjust set points.
    c. Add, modify, and delete time programming.
    d. Enable and disable process execution.
    e. Lock and unlock alarm reporting for each point.
    f. Enable and disable totalization for each point.
    g. Enable and disable trending for each point.
    h. Override control loop set points.
    i. Enter temporary override schedules.
    j. Define holiday schedules.

k. Change time and date.
l. Enter and modify analog alarm limits.
m. Enter and modify analog warning limits.
n. View limits.
o. Enable and disable demand limiting.
p. Enable and disable duty cycle.
q. Display logic programming for each control sequence.

9. Reporting:

a. Generated automatically and manually.
b. Sent to displays, printers and disc files.
c. Types of Reporting:

1) General listing of points.
2) List points currently in alarm.
3) List of off-line points.
4) List points currently in override status.
5) List of disabled points.
6) List points currently locked out.
7) List of items defined in a "Follow-Up" file.
8) List weekly schedules.
9) List holiday programming.
10) List of limits and deadbands.

10. Summaries: For specific points, for a logical point group, for an operator selected group(s), or for entire system without restriction due to hardware configuration.

C. Graphic Interface Software:

1. Include a full interactive graphical selection means of accessing and displaying system data to operator. Include at least five levels with the penetration path operator assignable (for example, site, building, floor, air-handling unit, and supply temperature loop). Native language descriptors assigned to menu items are to be operator defined and modifiable under password control.
2. Include a hierarchical-linked dynamic graphic operator interface for accessing and displaying system data and commanding and modifying equipment operation. Interface is to use a pointing device with pull-down or penetrating menus, color, and animation to facilitate operator understanding of system.
3. Include at least 10 levels of graphic penetration with the hierarchy operator assignable.
4. Make descriptors for graphics, points, alarms, and such modifiable through operator's workstation under password control.
5. Make graphic displays online user definable and modifiable using the hardware and software provided.
6. Make data displayed within a graphic assignable regardless of physical hardware address, communication, or point type.
7. Make graphics online programmable and under password control.
8. Make points assignable to multiple graphics where necessary to facilitate operator understanding of system operation.
9. Graphics to also contain software points.

10. Penetration within a graphic hierarchy is to display each graphic name as graphics are selected to facilitate operator understanding.
11. Provide a back-trace feature to permit operator to move upward in the hierarchy using a pointing device. Back trace to show all previous penetration levels. Include operator with option of showing each graphic full-screen size with back trace as horizontal header or by showing a "stack" of graphics, each with a back trace.
12. Display operator accessed data on the monitor.
13. Provide operator with ability to select further penetration using pointing device to click on a site, building, floor, area, equipment, and so on. Display defined and linked graphic below that selection.
14. Include operator with means to directly access graphics without going through penetration path.
15. Make dynamic data assignable to graphics.
16. Display points (physical and software) with dynamic data provided by Direct Digital Control system with appropriate text descriptors, status or value, and engineering unit.
17. Use color, rotation, or other highly visible means, to denote status and alarm states. Make colors variable for each class of points, as chosen by operator.
18. Provide dynamic points with operator adjustable update rates on a per point basis from onesecond to over a minute.
19. For operators with appropriate privilege, command points directly from display using pointing device.

    a. For an analog command point such as set point, display current conditions and limits so operator can position new set point using pointing device.
    b. For a digital command point such as valve position, show valve in current state such as open or closed so operator could select alternative position using pointing device.
    c. Include a keyboard equivalent for those operators with that preference.

20. Give operator ability to split or resize viewing screen into quadrants to show one graphic on one quadrant of screen and other graphics or spreadsheet, bar chart, word processing, curve plot, and other information on other quadrants on screen. This feature allows real-time monitoring of one part of system while displaying other parts of system or data to better facilitate overall system operation.
21. Help Features:

    a. Online context-sensitive help utility to facilitate operator instruction and understanding.
    b. Bridge to further explanation of selected keywords and contain text and graphics to clarify system operation.

        1) If help feature does not have ability to bridge on keywords for more information, provide a complete set of user manuals in an indexed word-processing program, which runs concurrently with operating system software.

    c. Available for Every Menu Item:

        1) Index items for each system menu item.

22. Provide graphic generation software to allow operator ability to add, modify, or delete system graphic displays.

    a. Include libraries of symbols depicting HVAC symbols such as fans, coils, filters, dampers, valves pumps, and electrical symbols.
    b. Use a pointing device in conjunction with a drawing program to allow operator to perform the following:

1) Define background screens.
2) Define connecting lines and curves.
3) Locate, orient, and size descriptive text.
4) Define and display colors for all elements.
5) Establish correlation between symbols or text and associated system points or other displays.

D. Project-Specific Graphics: Graphics documentation including, but not limited to, the following:

1. Site plan showing each building, and additional site elements, which are being controlled or monitored by Direct Digital Control system.
2. Plan for each building floor, including interstitial floors, and each roof level of each building, showing the following:

    a. Room layouts with room identification and name.
    b. Locations and identification of all monitored and controlled HVAC equipment and other equipment being monitored and controlled by Direct Digital Control system.
    c. Location and identification of each hardware point being controlled or monitored by Direct Digital Control system.

3. Control schematic for each of following, including a graphic system schematic representation with point identification, set point and dynamic value indication, sequence of operation and control logic diagram.
4. Graphic display for each piece of equipment connected to Direct Digital Control system through a data communications link. Include dynamic indication of all points associated with equipment.
5. Direct Digital Control system network riser diagram that shows schematic layout for entire system including all networks and all controllers, gateways operator workstations and other network devices.

E. Customizing Software:

1. Software to modify and tailor Direct Digital Control system to specific and unique requirements of equipment installed, to programs implemented and to staffing and operational practices planned.
2. Online modification of Direct Digital Control system configuration, program parameters, and database using menu selection and keyboard entry of data into preformatted display templates.
3. At a minimum, include the following modification capability:

    a. Operator Assignment: Designation of operator passwords, access levels, point segregation, and auto sign-off.
    b. Peripheral Assignment: Assignment of segregation groups and operators to consoles and printers, designation of backup workstations and printers, designation of workstation header points, and enabling and disabling of print-out of operator changes.
    c. System Configuration and Diagnostics; Communications and peripheral port assignments, Direct Digital Control controller assignments to network, Direct Digital Control controller enable and disable, assignment of command trace to points, and application programs and initiation of diagnostics.
    d. System Text Addition and Change: English or native language descriptors for points, segregation groups and access levels and action messages for alarms, run time, and trouble condition.

e. Time and Schedule Change: Time and date set, time and occupancy schedules, exception and holiday schedules, and daylight-savings time schedules.
f. Point related change capability is to include the following:

1) System and point enable and disable.
2) Run-time enable and disable.
3) Assignment of points to segregation groups, calibration tables, lockout, and run time and to a fixed I/O value.
4) Assignment of alarm and warning limits.

g. Application program change capability is to include the following:

1) Enable and disable of software programs.
2) Programming changes.
3) Assignment of comfort limits, global points, time and event initiators, time and event schedules and enable and disable time and event programs.

4. Provide software to allow operator ability to add points, or groups of points, to Direct Digital Control system and to link them to energy optimization and management programs. Make additions and modifications online programmable using operator workstations, downloaded to other network devices and entered into their databases. After verification of point additions and associated program operation, upload and record database on hard drive and disc for archived record.
5. Include high-level language programming software capability for implementation of custom Direct Digital Control programs. Include a compiler, linker, and up- and down-load capability.
6. Include a library of Direct Digital Control algorithms, intrinsic control operators, arithmetic, logic, and relational operators for implementation of control sequences. Also include, at a minimum, the following:

a. Proportional control (P).
b. Proportional plus integral (PI).
c. Proportional plus integral plus derivative (PID).
d. Adaptive and intelligent self-learning control.

1) Algorithm monitors loop response to output corrections and adjust loop response characteristics in accordance with time constant changes imposed.
2) Algorithm operates in a continuous self-learning manner and retains in memory a stored record of system dynamics so that on system shut down and restart, learning process starts from where it left off.

7. Fully implemented intrinsic control operators including sequence, reversing, ratio, time delay, time of day, highest select AO, lowest select AO, analog controlled digital output, analog control AO, and digitally controlled AO.
8. Logic operators such as "And," "Or," "Not," and others that are part of a standard set available with a high-level language.
9. Arithmetic operators such as "Add," "Subtract," "Multiply," "Divide," and others that are part of a standard set available with a high-level language.
10. Relational operators such as "Equal to," "Not Equal to," "Less Than," "Greater Than," and others that are part of a standard set available with a high-level language.

F. Alarm Handling Software:

1. Include alarm handling software to report all alarm conditions monitored and transmitted through Direct Digital Control controllers, gateways and other network devices.
2. Include first in, first out handling of alarms in accordance with alarm priority ranking, with most critical alarms first, and with buffer storage in case of simultaneous and multiple alarms.
3. Make alarm handling active at all times to ensure that alarms are processed even if an operator is not currently signed on to Direct Digital Control system.
4. Alarms display is to include the following:

    a. Indication of alarm condition such as "Abnormal Off," "Hi Alarm," and "Low Alarm."
    b. "Analog Value" or "Status" group and point identification with native language point descriptor such as "Space Temperature, Building 110, 2nd Floor, Room 212."
    c. Discrete per point alarm action message, such as "Call Maintenance Dept. Ext-5561."
    d. Include extended message capability to allow assignment and printing of extended action messages. Capability is to be operator programmable and assignable on a per point basis.

5. Direct alarms to appropriate operator workstations, printers, and individual operators by privilege level and segregation assignments.
6. Send email alarm messages to designated operators.
7. Send email, page, text, and voice messages to designated operators for critical alarms.
8. Categorize and process alarms by class.

    a. Class 1:

        1) Associated with fire, security, and other extremely critical equipment monitoring functions; have alarm, trouble, return to normal, and acknowledge conditions printed and displayed.
        2) Unacknowledged alarms to be placed in unacknowledged alarm buffer.
        3) All conditions make an audible alarm sound and require individual acknowledgment to silence audible sound.

    b. Class 2:

        1) Critical, but not life-safety related, and processed same as Class 1 alarms, except do not require individual acknowledgment.
        2) Acknowledgement may be through a multiple alarm acknowledgment.

    c. Class 3:

        1) General alarms; printed, displayed, and placed in unacknowledged alarm buffer queues.
        2) Configure so each new alarm received makes an audible alarm sound that are silenced by "acknowledging" alarm or by pressing a "silence" key.
        3) Make acknowledgement of queued alarms either on an individual basis or through a multiple alarm acknowledgement.
        4) Print alarms returning to normal condition without an audible alarm sound or require acknowledgment.

    d. Class 4:

        1) Routine maintenance or other types of warning alarms.

2) Alarms to be printed only, with no display, no audible sound and no acknowledgment required.

9. Include an unacknowledged alarm indicator on display to alert operator that there are unacknowledged alarms in system. Operator able to acknowledge alarms on an individual basis or through a multiple alarm acknowledge key, depending on alarm class.
10. To ensure that no alarm records are lost, make it possible to assign a backup printer to accept alarms in case of failure of primary printer.

G. Reports and Logs:

1. Include reporting software package that allows operator to select, modify, or create reports using Direct Digital Control system I/O point data available.
2. Setup each report so data content, format, interval, and date are operator definable.
3. Sample and store report data on Direct Digital Control controller, within storage limits of Direct Digital Control controller, and then uploaded to archive on server for historical reporting.
4. Make it possible for operators to obtain real-time logs of all I/O points by type or status, such as alarm, point lockout, or normal.
5. Store reports and logs on workstations and servers hard drives in a format that is readily accessible by other standard software applications, including spreadsheets and word processing.
6. Make reports and logs readily printable and set to be print either on operator command or at a specific time each day.

H. Standard Reports: Provide standard Direct Digital Control system reports with operator ability to customize reports later.

1. All I/O: With current status and values.
2. Alarm: All current alarms, except those in alarm lockout.
3. Disabled I/O: All I/O points that are disabled.
4. Alarm Lockout I/O: All I/O points in alarm lockout, whether manual or automatic.
5. Alarm Lockout I/O in Alarm: All I/O in alarm lockout that are currently in alarm.
6. Logs:

    a. Alarm history.
    b. System messages.
    c. System events.
    d. Trends.

I. Custom Reports: Operator able to easily define and prepare any system data into a daily, weekly, monthly, annual, or other historical report. Reports to include a title with time and date stamp.

J. HVAC Equipment Reports: Prepare Project-specific reports.

1. Terminal units

    a. Airflow

    b. Space temperature

    c. Damper position

d. Valve position(s)

2. Fan Coil Units

a. Fan status

b. Valve position

c. Space temperature

K. Utility Reports: Prepare Project-specific reports.

1. Electric Report:

a. Include weekly report showing daily electrical consumption and peak electrical demand with time and date stamp for each meter.
b. Include monthly report showing the daily electrical consumption and peak electrical demand with time and date stamp for each meter.
c. Include annual report showing monthly electrical consumption and peak electrical demand with time and date stamp for each meter.
d. For each weekly, monthly, and annual report, include sum total of submeters combined by load type, such as lighting, receptacles, and HVAC equipment showing daily electrical consumption and peak electrical demand.
e. For each weekly, monthly, and annual report, include sum total of all submeters in building showing electrical consumption and peak electrical demand.

2. Natural Gas Report:

a. Include weekly, monthly, and annual report showing daily natural gas consumption and peak natural gas demand with time and date stamp for each meter.
b. For each weekly, monthly, and annual report, include sum total of submeters combined by load type, such as boilers and service water heaters showing daily natural gas consumption and peak natural gas demand.
c. For each weekly, monthly, and annual report, include sum total of all submeters in building showing natural gas consumption and peak natural gas demand.

3. Service Water Report:

a. Include weekly, monthly, and annual report showing daily service water consumption and peak service water demand with time and date stamp for each meter.
b. For each weekly, monthly, and annual report, include sum total of submeters combined by load type, such as cooling tower makeup and irrigation showing daily service water consumption and peak service water demand.
c. For each weekly, monthly. and annual report, include sum total of all submeters in building showing service water consumption and peak service water demand.

L. Energy Reports: Prepare Project-specific daily, weekly, monthly, and annual , annual and since-installed energy reports.

1. Prepare report for each purchased energy utility, indicating the following:

    a. Time being reported with beginning and end date, and time indicated.
    b. Consumption in units of measure commonly used to report specific utility consumption over time.
    c. Gross area served by utility.
    d. Consumption per unit area served using utility-specific unit of measure.
    e. Cost per utility unit.
    f. Utility cost per unit area.
    g. Convert all utilities to a common energy consumption unit of measure and report for each utility.
    h. Consumption per unit area using common unit of measure.

2. Prepare purchased energy utility report for each submetered area that indicates the following:

    a. Time being reported with beginning and end date, and time indicated.
    b. Gross area served.
    c. Energy consumption by energy utility type.
    d. Energy consumption per unit area by energy utility type.
    e. Total energy consumption of all utilities in common units of measure.
    f. Total energy consumption of all utilities in common units of measure per unit area.
    g. Unit energy cost by energy utility type.
    h. Energy cost by energy utility type.
    i. Energy cost per unit area by energy utility type.
    j. Total cost of all energy utilities.
    k. Total cost of all energy utilities per unit area.

3. Prepare Project total purchased energy utility report that combines all purchased energy utilities and all areas served. Project total energy report is to indicate the following:

    a. Time being reported with beginning and end date, and time indicated.
    b. Gross area served.
    c. Energy consumption by energy utility type.
    d. Energy consumption per unit area by energy utility type.
    e. Total energy consumption of all utilities in common units of measure.
    f. Total energy consumption of all utilities in common units of measure per unit area.
    g. Unit energy cost by energy utility type.
    h. Energy cost by energy utility type.
    i. Energy cost per unit area by energy utility type.
    j. Total cost of all energy utilities.
    k. Total cost of all energy utilities per unit area.

M. HVAC System Efficiency Reports: Prepare Project-specific daily weekly monthly and annual , annual and since-installed HVAC system efficiency reports.

1. Prepare report for each heating hot-water system, indicating the following:

    a. Time being reported with beginning and end date, and time indicated.
    b. Heating energy supplied during period.

c. Fuel consumed during period by boilers used to produce heating energy supplied. List fuel consumed for each individual piece of equipment in system and summed total of all equipment in system.
d. Energy efficiency determined by dividing heating energy supplied into fuel energy consumed.
e. Units of measure used in report are to be consistent with units indicated for system.

N. Weather Reports:

1. Include daily report showing the following:

a. Daily minimum, maximum, and average outdoor dry-bulb temperature.
b. Daily minimum, maximum, and average outdoor wet-bulb temperature.
c. Daily minimum, maximum, and average outdoor dew point temperature.
d. Number of heating degree-days for each day calculated from a base temperature of 55 deg F.
e. Number of cooling degree-days for each day calculated from a base temperature of 65 deg F.
f. Daily minimum, maximum, and average outdoor carbon dioxide level.
g. Daily minimum, maximum, and average relative humidity.
h. Daily minimum, maximum, and average barometric pressure.
i. Daily minimum, maximum, and average wind speed and direction.

2. Include weekly report showing the following:

a. Daily minimum, maximum, and average outdoor dry-bulb temperature.
b. Daily minimum, maximum, and average outdoor wet-bulb temperature.
c. Daily minimum, maximum, and average outdoor dew point temperature.
d. Number of heating degree-days for each day calculated from a base temperature of 55 deg F.
e. Number of cooling degree-days for each day calculated from a base temperature of 65 deg F.
f. Weekly minimum, maximum, and average outdoor carbon dioxide level.
g. Daily minimum, maximum, and average relative humidity.
h. Daily minimum, maximum, and average barometric pressure.
i. Daily minimum, maximum, and average wind speed and direction.

3. Include monthly report showing the following:

a. Daily minimum, maximum, and average outdoor dry-bulb temperature.
b. Daily minimum, maximum, and average outdoor wet-bulb temperature.
c. Daily minimum, maximum, and average outdoor dew point temperature.
d. Number of heating degree-days for each day calculated from a base temperature of 55 deg F.
e. Number of cooling degree-days for each day calculated from a base temperature of 65 deg F.
f. Monthly minimum, maximum, and average outdoor carbon dioxide level.
g. Daily minimum, maximum, and average relative humidity.
h. Daily minimum, maximum, and average barometric pressure.
i. Daily minimum, maximum, and average wind speed and direction.

4. Include annual (12-month) report showing the following:

a. Monthly minimum, maximum, and average outdoor dry-bulb temperature.
b. Monthly minimum, maximum, and average outdoor wet-bulb temperature.
c. Monthly minimum, maximum, and average outdoor dew point temperature.
d. Number of heating degree-days for each month calculated from a base temperature of 55 deg F.

e. Number of cooling degree-days for each month calculated from a base temperature of 65 deg F.
f. Annual minimum, maximum, and average outdoor carbon dioxide level.
g. Monthly minimum, maximum, and average relative humidity.
h. Daily minimum, maximum, and average barometric pressure.
i. Daily minimum, maximum, and average wind speed and direction.

O. Standard Trends:

1. Trend all I/O point present values, set points, and other parameters indicated for trending.
2. Associate trends into groups, and setup a trend report for each group.
3. Store trends within Direct Digital Control controller and uploaded to hard drives automatically on reaching 75 percent of Direct Digital Control controller buffer limit, or by operator request, or by archiving time schedule.
4. Preset trend intervals for each I/O point after review with Commissioner.
5. Make trend intervals operator selectable from 10 seconds up to 60 minutes. Make minimum number of consecutive trend values stored at one time 100 per variable.
6. When drive storage memory is full, overwrite oldest data with most recent data.
7. Make archived and real-time trend data available for viewing numerically and graphically by operators.

P. Custom Trends: Operator-definable custom trend log for any I/O point in Direct Digital Control system.

1. Include each trend with interval, start time, and stop time.
2. Sample and store data on Direct Digital Control controller, within reaching 75 percent storage limits of Direct Digital Control controller, and then uploaded to archive on server hard drives.
3. Make data retrievable for use in spreadsheets and standard database programs.

Q. Programming Software:

1. Include programming software to execute sequences of operation indicated.
2. Include programming routines in simple and easy to follow logic with detailed text comments describing what the logic does and how it corresponds to sequence of operation.
3. Programming software is to be any of the following:

a. Graphic Based: Use a library of function blocks made from preprogrammed code designed for Direct Digital Control control systems.

1) Assemble function blocks with interconnection lines that represent to control sequence in a flowchart.
2) Make programming tools viewable in real time to show present values and logical results of each function block.

b. Menu Based: Done by entering parameters, definitions, conditions, requirements, and constraints.
c. Line by Line and Text Based: Programming is to declare variable types such as local, global, real, integer, and so on, at the beginning of the program. Use descriptive comments frequently to describe programming code.

4. Include means for detecting programming errors and testing software control strategies with a simulation tool before implementing in actual control. Simulation tool may be inherent with programming software or as a separate product.

R. Database Management Software:

1. Where a separate SQL database is used for information storage, include database management software that separates database monitoring and managing functions by supporting multiple separate windows.
2. Secure database access using standard SQL authentication including ability to access data for use outside of Direct Digital Control system applications.
3. Include database management function summarizing information on trend, alarm, event, and audit for the following database management actions:

    a. Backup.
    b. Purge.
    c. Restore.

4. Database management software supporting the following:

    a. Statistics: Display database server information and trend, alarm, event, and audit information on database.
    b. Maintenance: Include method of purging records from trend, alarm, event, and audit databases by supporting separate screens for creating a backup before purging, selecting database, and allowing for retention of a selected number of day's data.
    c. Backup: Include means to create a database backup file and select a storage location.
    d. Restore: Include a restricted means of restoring a database by requiring operator to have proper security level.

5. Information of current database activity, including the following:

    a. Ready.
    b. Purging record from a database.
    c. Action failed.
    d. Refreshing statistics.
    e. Restoring database.
    f. Shrinking a database.
    g. Backing up a database.
    h. Resetting Internet information services.
    i. Starting network device manager.
    j. Shutting down the network device manager.
    k. Action successful.

6. Database management software monitoring functions is to continuously read database information once operator has logged on.
7. Include operator notification through on-screen pop-up display and email message when database value has exceeded a warning or alarm limit.
8. Monitoring settings window with the following Sections:

a. Allow operator to set and review scan intervals and start times.
b. Email: Allow operator to create and review email and phone text messages to be delivered when a warning or an alarm is generated.
c. Warning: Allow operator to define warning limit parameters, set reminder frequency, and link email message.
d. Alarm: Allow operator to define alarm limit parameters, set reminder frequency, and link email message.
e. Database Login: Protect system from unauthorized database manipulation by creating a read access and a write access for each of trend, alarm, event, and audit databases as well as operator proper security access to restore a database.

9. Monitoring settings taskbar with following informational icons:

a. Normal: Indicates by color and size, or other easily identifiable means, that all databases are within their limits.
b. Warning: Indicates by color and size, or other easily identifiable means, that one or more databases have exceeded their warning limit.
c. Alarm: Indicates by color and size, or other easily identifiable means, that one or more databases have exceeded their alarm limit.

2.15 ANALYTICS SOFTWARE

A. Scope: Incorporate analytics software into Direct Digital Control System:

1. Licensing, without Recurring Cost: No re-occurring cost for licensing and subscriptions.
2. Licensing: With or without re-occurring cost for licensing and subscriptions.

a. For products with re-occurring costs, provide incremental costs broken down over a five-year operating period that begins at Substantial Completion.

3. Purpose: Analyze energy and operational data to identify faults and opportunities for improved performance and reduced energy use.
4. Verification: Verify that HVAC systems and associated sequence of operations are executing as specified or as described on Drawings, through the analysis of energy and operational data, identification of faults showing where control sequences are not functioning as prescribed, and identification of opportunities for improved performance in the operation of systems.

B. Use during Project Life:

1. During Construction: Use for verification of performance during startup, commissioning, and final acceptance of Direct Digital Control system.
2. During Warranty Period: Use for continuous operational tuning of Direct Digital Control system and verification of operation and designed to identify warranty issues preemptively, thus reducing failures and potential down time.
3. After Warranty Period: Use to diagnose ongoing operational degradation and for City of New York to perform continuous monitoring-based commissioning.

C. Minimum Features and Capabilities:

1. Operating Systems: Current version of Windows-based operating systems.
2. Time Series Database: Database technology, designed for efficient storage and analysis of large volumes of time series data, using tagging to model and describe data; supports an open-source tagging standard.
3. Data Import: Ability to accept and normalize data from a variety of sources including SQL compatible databases, CSV format files, XML format files or web services, and other EDI techniques. Once imported, software is to provide a unified data format to enable analytics algorithms to identify patterns across different data sets.
4. Open Interfaces: Open, REST-based APIs to enable integration with third-party software applications. Open APIs are to enable data to be entered/imported into database, exported from database, posting of analytic queries, and output of analytic results. APIs are to be fully documented and available as part of standard product.
5. Host: Local deployed on Direct Digital Control system network.
6. Weather Data Service: Built-in worldwide weather service providing weather data including, but not limited to, the following:

    a. Current temperature.
    b. High temperature for the day.
    c. Low temperature for the day.
    d. Sunrise and sunset times.
    e. Relative humidity.
    f. Degree days (heating and cooling with adjustable balance point value).
    g. Seven-day forecast.
    h. Historical weather data extending back at least one year.

7. Email Notification: Automatic notification of detected issues via email including, but not limited to, the following:

    a. Immediate notification of detected issues.
    b. Daily digest or summary of detected issues.
    c. Ability to delineate which notifications are sent to which recipients down to the level of specifying individual issues sent to individual recipients.

D. Hardware Requirements:

1. Host on a server in a virtual environment complying with City of New York's security requirements.
2. Comply with standard software and hardware profiles required by City of New York.

E. Analytic Rules:

1. Custom Rule Development: Develop customized rules and algorithms tailored to operational needs and characteristics of individual facilities and needs of monitoring and verification project and fault-detection requirements of Project without depending on manufacturer for rule development. Provide tools for user development and full documentation.
2. Standard Analytic Functions: Library of standard analytic functions is to use these standard analytic functions as elements to build custom analytic rules for specific needs of individual facilities.
3. Existing library of not less than 200 standard analytic rules written for applications similar to those required for this Project.

F. Reporting:

1. Standard Views of Analytic Results: Standard views to present analytic results, automatically generated when issues are found by analytic rules including, but not limited to, the following:

    a. Rules violations across a portfolio of sites, rules violations per site, including time, date, and duration of all violations.
    b. Ability to assign cost relationships to rule logic to provide cost per violation.
    c. Standard filters to enable operator to easily look at rule violations by site, data, and violation type for any selected date or date range.
    d. Automatic calculation and presentation of Key Performance Indicators (KPIs) and to define custom KPIs as needed.

2. Custom Views of Analytic Results:

    a. Any standard system view is to be able to be saved as a custom report including its configuration criteria, e.g., time range, sites, rule violations, or other configuration options as applicable to standard system view.
    b. Created by making queries against the database and saving the query as a saved report executed by single mouse click.
    c. Export: Support report views export into CSV, Excel, XML, and HTML format, accomplished in a couple of mouse clicks.

G. Energy-Specific Reporting and Information Presentation Tools:

1. Greenhouse Gas Analysis: Energy/carbon dioxide relationships; easily changed and added without involvement of software manufacturer.
2. Energy Baseline: Quantify and define energy consumption and demand baselines (including weather normalization metrics) and compare actual and forecasted energy demand and consumption against those baselines.
3. Benchmarking: Multisite benchmarking to compare energy consumption and demand profiles and baselines across all buildings within City of New York's portfolio.
4. Forecasting: Forecast near-future loads by using historic trends and forecasted weather data.
5. Financial Analysis: Calculate costs based on energy consumption and demand and energy costs and associate costs with any faults discovered by any analytic function and perform model- or tariff-based calculations to determine costs.
6. Tracking of Key Performance Indicators: Definition and tracking of user-defined key performance indicators/operational metrics. Examples include energy demand and consumption normalized for area and weather, peak demand, and consumption shown with minimum and maximum ranges across any user-selectable period.
7. Correlation of Energy Use with Equipment Operation: Automatically present views showing correlation between energy demand and consumption and operation of loads associated with that usage. Include the following:

    a. All submeters and virtual meters.
    b. Weather data as a selectable item.

H. Implementation:

1. Apply analytic rules to all HVAC systems and equipment monitored and controlled by Direct Digital Control system. To extent available, use a subset of rules in existing rules library.
2. Implement rules to aid in determining proper operation of any HVAC system with a programmed sequence of operation.
3. Generate reports to aid in verification of proper operation during initial system startup and commissioning to supplement (not replace) commissioning agent reports.
4. Prepare quarterly reports summarizing faults detected and KPIs, including recommended corrective action.

I. Instruction:

1. Instruct City of New York personnel sufficiently to use software without need for external support.

2.16 OFFICE APPLICATION SOFTWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Microsoft Corporation.
2. Linux
3. Apple.
4. Or approved equal.

B. Include current version of office application software at time of Substantial Completion.

C. Office application software package to include multiple separate applications and use a common platform for all applications.

1. Database.
2. Email.
3. Presentation.
4. Publishing.
5. Spreadsheet.
6. Word processing.

2.17 ASHRAE 135 GATEWAYS

A. Include BACnet communication ports, whenever available as an equipment OEM standard option, for integration via a single communication cable. BACnet-controlled plant equipment includes, but is not limited to, boilers, variable refrigerant systems, packaged air conditioning units, and variable-speed drives.

B. Include with each gateway an interoperability schedule showing each point or event on legacy side that BACnet "client" will read, and each parameter that BACnet network will write to. Describe this interoperability of BACnet services, or BIBBs, defined in ASHRAE 135, Annex K.

C. Gateway Minimum Requirements:

1. Read and view all readable object properties on non-BACnet network to BACnet network, and vice versa, where applicable.

2. Write to all writable object properties on non-BACnet network from BACnet network, and vice versa, where applicable.
3. Include single-pass (only one protocol to BACnet without intermediary protocols) translation from non-BACnet protocol to BACnet, and vice versa.
4. Comply with requirements of Data Sharing Read Property, Data Sharing Write Property, Device Management Dynamic Device Binding-B, and Device Management Communication Control BIBBs in accordance with ASHRAE 135.
5. Hardware, software, software licenses, and configuration tools for operator-to-gateway communications.
6. Backup programming and parameters on CD media with ability to modify, download, backup, and restore gateway configuration.

2.18 ASHRAE 135 PROTOCOL ANALYZER

A. Analyzer and required cables and fittings for connection to ASHRAE 135 network.

B. Include the following minimum capabilities:

1. Capture and store to a file data traffic on all network levels.
2. Measure bandwidth usage.
3. Filtering options with ability to ignore select traffic.

2.19 CTA-709.1-D NETWORK HARDWARE

A. Routers:

1. Network routers, including routers configured as repeaters, are to comply with requirements of CTA-709.1-D and include connection between two or more CTA-709.3 TP/FT-10 channels or between two or more CTA-709.3 TP/FT-10 channels and a TP/XF-1250 channel.
2. IP Routers:

    a. Perform layer three routing of CTA-709.1-D packets over an IP network in accordance with CTA-852-C.
    b. Include appropriate connection to IP network and connections to CTA-709.3 TP/FT-10 or TP/XF-1250 network.
    c. Support the Dynamic Host Configuration Protocol for IP configuration and use of an CTA-852-C Configuration Server (for CTA-852-C configuration), but do not rely on these services for configuration.
    d. Capable of manual configuration via a console RS-232 port.

B. Gateways:

1. Perform bidirectional protocol translation from one non-CTA-709.1-D protocol to CTA-709.1-D.
2. Incorporate a network connection to TP/FT-10 network in accordance with CTA-709.3 and a connection for non-CTA-709.1-D network.

2.20 DIRECT DIGITAL CONTROL CONTROLLERS

A. Direct Digital Control system consisting of a combination of network controllers, programmable application controllers, and application-specific controllers to satisfy performance requirements indicated.

B. Direct Digital Control controllers to perform monitoring, control, energy optimization, and other requirements indicated.

C. Direct Digital Control controllers are to use a multitasking, multiuser, real-time digital control microprocessor with a distributed network database and intelligence.

D. Each Direct Digital Control controller is capable of full and complete operation as a completely independent unit and as a part of Direct Digital Control system wide distributed network.

E. Environment Requirements:

1. Controller hardware suitable for anticipated ambient conditions.
2. Controllers located in conditioned space rated for operation at 32 to 120 deg F.
3. Controllers located outdoors rated for operation at 40 to 150 deg F.

F. Power and Noise Immunity:

1. Operate controller at 90 to 110 percent of nominal voltage rating and perform an orderly shutdown below 80 percent of nominal voltage.
2. Protect against electrical noise of 5 to 120 Hz and from keyed radios with up to 5 W of power located within 36 inches of enclosure.

G. Direct Digital Control Controller Spare Processing Capacity:

1. Include spare processing memory for each controller. RAM, PROM, or EEPROM will implement requirements indicated with the following spare memory:

    a. Network Controllers: 50 percent.
    b. Programmable Application Controllers: Not less than 60 percent.
    c. Application-Specific Controllers: Not less than 70 percent.

2. Memory for Direct Digital Control controller's operating system and database are to include the following:

    a. Monitoring and control.
    b. Energy management, operation, and optimization applications.
    c. Alarm management.
    d. Historical trend data of all connected I/O points.
    e. Maintenance applications.
    f. Operator interfaces.
    g. Monitoring of manual overrides.

H. Direct Digital Control Controller Spare I/O Point Capacity: Include spare I/O point capacity for each controller as follows:

1. Network Controllers:

   a. 10 percent of each AI, AO, BI, and BO point connected to controller.
   b. Minimum Spare I/O Points per Controller:

      1) AIs: Two.
      2) AOs: Two.
      3) BIs: Three.
      4) BOs: Three.
      5) Option to provide universal I/O to meet spare requirements.

2. Programmable Application Controllers:

   a. 10 percent of each AI, AO, BI, and BO point connected to controller.
   b. Minimum Spare I/O Points per Controller:

      1) AIs: Two.
      2) AOs: Two.
      3) BIs: Three.
      4) BOs: Three.
      5) Option to provide universal I/O to meet spare requirements.

3. Application-Specific Controllers:

   a. 10 percent of each AI, AO, BI, and BO point connected to controller.
   b. Minimum Spare I/O Points per Controller:

      1) AIs: One.
      2) AOs: One.
      3) BIs: One.
      4) BOs: One.
      5) Option to provide universal I/O to meet spare requirements.

I. Maintenance and Support: Include the following features to facilitate maintenance and support:

1. Mount microprocessor components on circuit cards for ease of removal and replacement.
2. Means to quickly and easily disconnect controller from network.
3. Means to quickly and easily access connect to field test equipment.
4. Visual indication that controller electric power is on, of communication fault or trouble, and that controller is receiving and sending signals to network.

J. General Requirements for CTA-709.1-D Direct Digital Control Controllers:

1. LonMark certified.
2. Distinguishable and accessible switch, button, or pin, when pressed is to broadcast its 48-bit Node ID and Program ID over network.

3. TP/FT-10 transceiver in accordance with CTA-709.3 and connections for TP/FT-10 control network wiring.
4. TP/XF-1250 transceiver in accordance with CTA-709.3 and connections for TP/XF-1250 control network wiring.
5. Communicate using CTA-709.1-D protocol.
6. Controllers configured into subnets, as required, to comply with performance requirements indicated.
7. Network communication through LNS network management and database standard for CTA-709.1-D network devices.
8. Locally powered, not powered through network connection.
9. Functionality required to support applications indicated including, but not limited to, the following:

    a. I/Os indicated and as required to support sequence of operation and application in which it is used. SNVTs to have meaningful names identifying the value represented by SNVT. Unless SNVT of an appropriate engineering type is unavailable, all network variables to be of SNVT with engineering units appropriate to value the variable represents.
    b. Configurable through SCPTs defined in LonMark SCPT List, operator-defined UCPTs, network configuration inputs (NCIs) of SNVT type defined in LonMark SNVT List, NCIs of an operator-defined network variable type, or hardware settings on controller itself for all settings and parameters used by application in which it is used.

10. Programmable controllers comply with "LonMark Interoperability Guidelines" and have LonMark certification.

K. I/O Point Interface:

1. Connect hardwired I/O points to network, programmable application, and application-specific controllers.
2. Protect I/O points so shorting of point to itself, to another point, or to ground will not damage controller.
3. Protect I/O points from voltage up to 24 V of any duration so that contact will not damage controller.
4. AIs:

    a. Include monitoring of low-voltage (0 to 10 V dc), current (4 to 20 mA) and resistance signals from thermistor and RTD sensors.
    b. Compatible with, and field configurable to, sensor and transmitters installed.
    c. Perform analog-to-digital (A-to-D) conversion with a minimum resolution of 8 bits or better to comply with accuracy requirements indicated.
    d. Signal conditioning including transient rejection for each AI.
    e. Capable of being individually calibrated for zero and span.
    f. Incorporate common-mode noise rejection of at least 50 dB from 0 to 100 Hz for differential inputs, and normal-mode noise rejection of at least 20 dB at 60 Hz from a source impedance of 10000 ohms.
    g. External conversion resistors are not permitted.

5. AOs:

    a. Perform analog-to-digital (A-to-D) conversion with a minimum resolution of 8 bits or better to comply with accuracy requirements indicated.

b. Output signals range of 4 to 20 mA dc or 0 to 10 V dc as required to include proper control of output device.
c. Capable of being individually calibrated for zero and span.
d. Drift is to be not greater than 0.4 percent of range per year.
e. External conversion resistors are not permitted.

6. BIs:

a. Accept contact closures and ignore transients of less than 5 ms duration.
b. Isolate and protect against an applied steady-state voltage of up to 180 V ac peak.
c. Include a wetting current of at least 12 mA to be compatible with commonly available control devices and protected against effects of contact bounce and noise.
d. Sense "dry contact" closure without external power (other than that provided by controller) being applied.
e. Pulse accumulation input points complying with all requirements of BIs and accept up to 10 pulses per second for pulse accumulation. Include buffer to totalize pulses. Pulse accumulator is to accept rates of at least 20 pulses per second. Reset the totalized value to zero on operator's command.

7. BOs:

a. Include relay contact closures or triac outputs for momentary and maintained operation of output devices.

1) Relay contact closures to have a minimum duration of 0.1 second and at least 180 V of isolation.
2) Include electromagnetic interference suppression on all output lines to limit transients to non-damaging levels.
3) Minimum contact rating to be 1 A at 24 V ac.
4) Triac outputs to have at least 180 V of isolation and minimum contact rating of 1 A at 24 V ac.

b. Include BOs with two-state operation or a pulsed low-voltage signal for pulse-width modulation control.
c. BOs to be selectable for either normally open or normally closed operation.
d. Include tristate outputs (two coordinated BOs) for control of three-point, floating-type electronic actuators without feedback.
e. Limit use of three-point floating devices to VAV terminal unit control applications. Control algorithms to operate actuator to one end of its stroke once every 24 hours for verification of operator tracking.

2.21 NETWORK CONTROLLERS

A. General:

1. Include adequate number of controllers to achieve performance indicated.
2. Provide one or more independent, standalone, microprocessor-based network controllers to manage global strategies indicated.

3. Include enough memory to support its operating system, database, and programming requirements with spare memory indicated.
4. Share data between networked controllers and other network devices.
5. Operating system of controller to manage I/O communication signals to allow distributed controllers to share real and virtual object information and allow for central monitoring and alarms.
6. Include network controllers with a real-time clock.
7. Controller to continually check status of its processor and memory circuits. If an abnormal operation is detected, controller is to assume a predetermined failure mode and generate an alarm notification.
8. Make controllers fully programmable.

B. Communication:

1. Network controllers communicate with other devices on Direct Digital Control system Level 1 network.
2. Network controller to also perform routing if connected to network of programmable application controllers and application-specific controllers.

C. Operator Interface:

1. Equip controllers with a service communications port for connection to desktop operator's workstation portable operator's workstation POT mobile device.
2. Local Keypad and Display:

   a. Equip controller with local keypad and digital display for interrogating and editing data.
   b. Use of keypad and display requires a security password.

D. Serviceability:

1. Equip controller with diagnostic LEDs or other form of local visual indication of power, communication, and processor.
2. Connect wiring and cable connections to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Maintain Basic Input Output System (BIOS) and programming information in event of power loss for at least 72 hours.

2.22 PROGRAMMABLE APPLICATION CONTROLLERS

A. General:

1. Include adequate number of controllers to achieve performance indicated.
2. Provide enough memory to support its operating system, database, and programming requirements with spare memory indicated.
3. Share data between networked controllers and other network devices.
4. Include controller with operating system to manage I/O communication signals to allow distributed controllers to share real and virtual object information and allow for central monitoring and alarms.
5. Include controllers that perform scheduling with a real-time clock.
6. Controller is to continually check status of its processor and memory circuits. If an abnormal operation is detected, controller assumes a predetermined failure mode and generates an alarm notification.

7. Fully programmable.

B. Communication:

1. Programmable application controllers are to communicate with other devices on network.

C. Operator Interface:

1. Equip controllers with a service communications port for connection to desktop operator's workstation portable operator's workstation POT mobile device.
2. Local Keypad and Display:

a. Equip controller with local keypad and digital display for interrogating and editing data.
b. Protect use of keypad and display by security password.

D. Serviceability:

1. Equip controller with diagnostic LEDs or other form of local visual indication of power, communication, and processor.
2. Connect wiring and cable connections to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Maintain BIOS and programming information in event of power loss for at least 72 hours.

2.23 APPLICATION-SPECIFIC CONTROLLERS

A. Description: Microprocessor-based controllers, which through hardware or firmware design are dedicated to control a specific piece of equipment or system. Controllers are not fully user-programmable but are configurable and customizable for operation of equipment they are designed to control.

1. Capable of standalone operation and continued control functions without being connected to network.
2. Share data between networked controllers and other network devices.

B. Communication: Application-specific controllers are to communicate with other application-specific controllers and devices on network, and to programmable application controllers and network controllers.

C. Operator Interface: Equip controllers with a service communications port for connection to desktop workstation portable operator's workstation POT mobile device. Connection is to extend to port on space temperature sensor that is connected to controller.

D. Serviceability:

1. Equip controller with diagnostic LEDs or other form of local visual indication of power, communication, and processor.
2. Connect wiring and cable connections to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Use nonvolatile memory and maintain all BIOS and programming information in event of power loss.

2.24 CONTROLLER SOFTWARE

A. General:

1. Software applications are to reside and operate in controllers. Edit applications through operator workstations.
2. Identify I/O points by up to 30 -character point name and up to 16 -character point descriptor. Use same names throughout, including at operator workstations.
3. Execute control functions within controllers using Direct Digital Control algorithms.
4. Configure controllers to use stored default values to ensure fail-safe operation. Use default values when there is a failure of a connected input instrument or loss of communication of a global point value.

B. Security:

1. Secure operator access using individual security passwords and user names.
2. Passwords restrict operator to points, applications, and system functions as assigned by system manager.
3. Record operator log-on and log-off attempts.
4. Protect from unauthorized use by automatically logging off after last keystroke. Make the delay time operator-definable.

C. Scheduling: Include capability to schedule each point or group of points in system. Each schedule is to consist of the following:

1. Weekly Schedule:

a. Include separate schedules for each day of week.
b. Each schedule should include capability for start, stop, optimal start, optimal stop, and night economizer.
c. Each schedule may consist of up to 10 events.
d. When a group of objects are scheduled together, include capability to adjust start and stop times for each member.

2. Exception Schedules:

a. Include ability for operator to designate any day of the year as an exception schedule.
b. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed, it will be discarded and replaced by regular schedule for that day of week.

3. Holiday Schedules:

a. Include capability for operator to define up to 99 special or holiday schedules.
b. Place schedules on scheduling calendar with ability to repeated each year.
c. Operator able to define length of each holiday period.

D. System Coordination:

1. Include standard application for proper coordination of equipment.
2. Include operator with a method of grouping together equipment based on function and location.
3. Include groups that may be for use in scheduling and other applications.

E. Binary Alarms:

1. Set each binary point to alarm based on operator-specified state.
2. Include capability to automatically and manually disable alarming.

F. Analog Alarms:

1. Provide each analog object with both high and low alarm limits.
2. Include capability to automatically and manually disable alarming.

G. Alarm Reporting:

1. Include ability for operators to determine action to be taken in event of an alarm.
2. Route alarms to appropriate operator workstations based on time and other conditions.
3. Include ability for alarms to start programs, print, be logged in event logs, generate custom messages, and display graphics.

H. Remote Communication:

1. Include ability for system to notify operators by phone message, text message, and email in event of an alarm.

I. Electric Power Demand Limiting:

1. Monitor building or other operator-defined electric power consumption from signals connected to electric power meter or from a watt transducer or current transformer.
2. Predict probable power demand such that action can be taken to prevent exceeding demand limit. When demand prediction exceeds demand limit, action will be taken to reduce loads in a predetermined manner. When demand prediction indicates demand limit will not be exceeded, action will be taken to restore loads in a predetermined manner.
3. Accomplish demand reduction by the following means:

    a. Reset air-handling-unit supply temperature set points.
    b. Reset space temperature set points.
    c. De-energize equipment based on priority.

4. Base demand-limiting parameters, frequency of calculations, time intervals, and other relevant variables on the means by which electric power service provider computes demand charges.
5. Include demand-limiting prediction and control for any individual meter monitored by system or for total of any combination of meters.
6. Include means operator to make the following changes online:

    a. Addition and deletion of loads controlled.
    b. Changes in demand intervals.
    c. Changes in demand limit for meter(s).

d. Maximum shutoff time for equipment.
e. Minimum shutoff time for equipment.
f. Select rotational or sequential shedding and restoring.
g. Shed and restore priority.

7. Include the following information and reports, to be available on an hourly, daily, weekly, monthly, and annual basis:

a. Total electric consumption.
b. Peak demand.
c. Date and time of peak demand.
d. Daily peak demand.

J. Maintenance Management: Monitor equipment status and generate maintenance messages based on operator-designated run-time, starts, and calendar date limits.

K. Sequencing: Include application software based on sequences of operation indicated to properly sequence chillers, boilers, and other applicable HVAC equipment.

L. Control Loops:

1. Support any of the following control loops, as applicable to control required:

a. Two-position (on/off, open/close, slow/fast) control.
b. Proportional control.
c. Proportional plus integral (PI) control.
d. Proportional plus integral plus derivative (PID) control.

1) Include PID algorithms with direct or reverse action and anti-windup.
2) Algorithm to calculate a time-varying analog value used to position an output or stage a series of outputs.
3) Make controlled variable, set point, and PID gains operator-selectable.

e. Adaptive (automatic tuning).

M. Staggered Start: Prevent all controlled equipment from simultaneously restarting after a power outage. Make the order which equipment (or groups of equipment) is started, along with the time delay between starts, operator-selectable.

N. Energy Calculations:

1. Include software to allow instantaneous power or flow rates to be accumulated and converted to energy usage data.
2. Include algorithm that calculates a sliding-window average (rolling average). Make algorithm flexible to allow window intervals to be operator specified (such as 15, 30, or 60 minutes).
3. Include algorithm that calculates a fixed-window average. Use a digital input signal to define start of window period (such as signal from utility meter) to synchronize fixed-window average with that used by utility.

O. Anti-Short Cycling:

1. Protect BO points from short cycling.
2. Feature to allow minimum on-time and off-time to be selected.

P. On and Off Control with Differential:

1. Include algorithm that allows BO to be cycled based on a controlled variable and set point.
2. Use direct- or reverse-acting algorithm and incorporate an adjustable differential.

Q. Run-Time Totalization:

1. Include software to totalize run-times for all BI points.
2. Assign a high run-time alarm, if required, by operator.

2.25 ENCLOSURES

A. General:

1. House each controller and associated control accessories in single enclosure. Enclosure is to serve as central tie-in point for control devices such as switches, transmitters, transducers, power supplies, and transformers.
2. Do not house more than one controller in single enclosure.
3. Include enclosure door with key locking mechanism. Key locks alike for all enclosures and include one pair of keys per enclosure.
4. Equip doors of enclosures housing controllers and components with analog or digital displays with windows to allow visual observation of displays without opening enclosure door.
5. Individual, wall-mounted, single-door enclosures maximum of 36 inches wide and 48 inches high.
6. Individual, wall-mounted, double-door enclosures maximum of 60 inches wide and 36 inches high.
7. Freestanding enclosures maximum of 48 inches wide and 72 inches high.
8. Include wall-mounted enclosures with brackets suitable for mounting enclosures to wall or freestanding support stand as indicated.
9. Supply each enclosure with complete set of as-built schematics, tubing, and wiring diagrams and product literature located in pocket on inside of door.

B. Internal Arrangement:

1. Arrange internal layout of enclosure to group and protect electric, and electronic components associated with controller, but not an integral part of controller.
2. Arrange layout to group similar products together.
3. Include a barrier between line-voltage and low-voltage electrical and electronic products.
4. Factory or shop install products, tubing, cabling, and wiring complying with requirements and standards indicated.
5. Terminate field cable and wire using heavy-duty terminal blocks.
6. Include spare terminals, equal to not less than 10 percent of used terminals.
7. Include spade lugs for stranded cable and wire.
8. Install maximum of two wires on each side of terminal.
9. Include enclosure field electric power supply with toggle-type switch located at entrance inside enclosure to disconnect power.

10. Include enclosure with line-voltage nominal 20 A GFCI duplex receptacle for service and testing tools. Wire receptacle on hot side of enclosure disconnect switch and include with 5 A circuit breaker.
11. Mount products within enclosure on removable internal panel(s).
12. Include products mounted in enclosures with engraved, laminated phenolic nameplates (black letters on a white background). Nameplates are to have at least 1/4-inch- high lettering.
13. Route tubing cable and wire located inside enclosure within a raceway with continuous removable cover.
14. Label each end of cable, wire, and tubing in enclosure following an approved identification system that extends from field I/O connection and all intermediate connections throughout length to controller connection.
15. Size enclosure internal panel to include at least 15 percent spare area on face of panel.

C. Environmental Requirements:

1. Evaluate temperature and humidity requirements of each product to be installed within each enclosure.
2. Calculate enclosure internal operating temperature considering heat dissipation of all products installed within enclosure and ambient effects (solar, conduction, and wind) on enclosure.
3. Where required by application, include temperature-controlled electrical heat to maintain inside of enclosure above minimum operating temperature of product with most stringent requirement.
4. Where required by application, include temperature-controlled ventilation fans with filtered louver(s) to maintain inside of enclosure below maximum operating temperature of product with most stringent requirement.
5. Include temperature-controlled cooling within the enclosure for applications where ventilation fans cannot maintain inside temperature of enclosure below maximum operating temperature of product with most stringent requirement.
6. Where required by application, include humidity-controlled electric dehumidifier or cooling to maintain inside of enclosure below maximum relative humidity of product with most stringent requirement and to prevent surface condensation within enclosure.

D. Wall-Mounted, NEMA 250, Type 1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. B-line; Eaton, Electrical Sector.
    b. Hammond Mfg. Co. Inc.
    c. Hoffman; nVent.
    d. Saginaw Control and Engineering.
    e. Or approved equal.

2. NRTL listed in accordance with UL 50 or UL 50E.
3. Construct enclosure of steel, not less than the following:

    a. Enclosure Size Less Than 24 Inches: 0.067 inch thick.
    b. Enclosure Size 24 Inches and Larger: 0.093 inch thick.

4. Finish enclosure inside and out with polyester powder coating that is electrostatically applied and then baked to bond to substrate.

    a. Exterior Color: Manufacturer's standard.

b. Interior Color: Manufacturer's standard.

5. Hinged door full size of front face of enclosure and supported using the following:

   a. Enclosures Sizes Less Than 36 Inches Tall: Multiple butt hinges.
   b. Enclosures Sizes 36 Inches Tall and Larger: Continuous piano hinges.

6. Removable internal panel with gray polyester powder coating that is electrostatically applied and then baked to bond to substrate.

   a. Size Less Than 24 Inches: Solid steel, 0.053 inch thick.
   b. Size 24 Inches and Larger: Solid steel, 0.093 inch thick.

7. Internal panel mounting hardware, grounding hardware, and sealing washers.
8. Grounding stud on enclosure body.
9. Thermoplastic pocket on inside of door for record Drawings and Product Data.

E. Wall-Mounted, NEMA 250, Types 4 and 12:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. B-line; Eaton, Electrical Sector.
   b. Hammond Mfg. Co. Inc.
   c. Hoffman; nVent.
   d. Saginaw Control and Engineering.
   e. Or approved equal.

2. NRTL listed in accordance with UL 508A.
3. Seam and joints are continuously welded and ground smooth.
4. Where recessed enclosures are indicated, include enclosures with face flange for flush mounting.
5. Externally formed body flange around perimeter of enclosure face for continuous perimeter seamless gasket door seal.
6. Single-door enclosure sizes up to 60 inches tall by 36 inches wide.
7. Double-door enclosure sizes up to 36 inches tall by 60 inches wide.
8. Construct enclosure of steel, not less than the following:

   a. Size Less Than 24 Inches: 0.067 inch thick.
   b. Size 24 Inches and Larger: 0.067 inch thick.

9. Finish enclosure with polyester powder coating that is electrostatically applied and then baked to bond to substrate.

   a. Exterior Color: Manufacturer's standard.
   b. Interior Color: Manufacturer's standard.

10. Corner-formed door, full size of enclosure face, supported using multiple concealed hinges with easily removable hinge pins.

    a. Sizes through 24 Inches Tall: Two hinges.
    b. Sizes between 24 Inches through 48 Inches Tall: Three hinges.

c. Sizes Larger Than 48 Inches Tall: Four hinges.

11. Double-door enclosures with overlapping door design to include unobstructed full-width access.

    a. Single-door enclosures 48 inches and taller, and all double-door enclosures, with three-point (top, middle and bottom) latch system.

12. Removable internal panel with gray polyester powder coating that is electrostatically applied and then baked to bond to substrate.

    a. Size Less Than 24 Inches: Solid steel, 0.053 inch thick.
    b. Size 24 Inches and Larger: Solid steel, 0.093 inch thick.

13. Internal panel mounting studs with hardware, grounding hardware, and sealing washers.
14. Grounding stud on enclosure body.
15. Thermoplastic pocket on inside of door for record Drawings and Product Data.

F. Wall-Mounted, NEMA 250, Type 4X-SS:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Crouse-Hinds; Eaton, Electrical Sector.
    b. Hammond Mfg. Co. Inc.
    c. Hoffman; nVent.
    d. Saginaw Control and Engineering.
    e. Or approved equal.

2. NRTL listed in accordance with UL 508A.
3. Seams and joints are continuously welded and ground smooth.
4. Externally formed body flange around perimeter of enclosure face for continuous perimeter seamless gasket door seal.
5. Construct enclosure of Type 304 or Type 316L stainless steel, not less than the following:

    a. Size Less Than 24 Inches: 0.053 inch thick.
    b. Size 24 Inches and Larger: 0.067 inch thick.

6. Outside body and door of enclosure with brushed No. 4 finish.
7. Corner-formed door, full size of enclosure face, supported using multiple concealed hinges with easily removable hinge pins.

    a. Sizes through 24 Inches Tall: Two hinges.
    b. Sizes between 24 Inches through 48 Inches Tall: Three hinges.
    c. Sizes Larger Than 48 Inches Tall: Four hinges.

8. Corner-formed door, full size of enclosure face, supported using continuous piano hinge full length of door.
9. Doors fitted with three-point (top, middle, and bottom) latch system with single, heavy-duty, liquidtight, Type 304 or Type 316L stainless steel handle with integral locking mechanism.
10. Removable internal panel of 0.093-inch stainless steel.
11. Internal panel mounting studs and hardware, grounding hardware, and sealing washers.

12. Install corrosion-resistant polyester vent drain in a stainless steel sleeve at bottom of enclosure.
13. Include enclosure with stainless steel mounting brackets.

G. Freestanding, NEMA 250, Type 1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. B-line; Eaton, Electrical Sector.
    b. Hammond Mfg. Co. Inc.
    c. Hoffman; nVent.
    d. Saginaw Control and Engineering.
    e. Or approved equal.

2. NRTL listed in accordance with UL 508A.
3. Seams and joints are continuously welded and ground smooth.
4. Externally formed body flange around perimeter of enclosure face.
5. Single-door enclosure sizes up to 84 inches tall by 36 inches wide.
6. Double-door enclosure sizes up to 84 inches tall by 72 inches wide.
7. Construct enclosure of steel, not less than 0.067 inch thick.
8. Finish enclosure with polyester powder coating that is electrostatically applied and then baked to bond to substrate.

    a. Exterior Color: Manufacturer's standard.
    b. Interior Color: Manufacturer's standard.

9. Corner-formed flush door, full size of enclosure face, supported using four concealed hinges with easily removable hinge pins.
10. Double-door enclosures with overlapping door design to include unobstructed full-width access.
11. Doors with three-point (top, middle, and bottom) latch system with single heavy-duty handle and integral locking mechanism.
12. Removable back covers.
13. Removable solid steel internal panel, 0.093 inch thick, with gray polyester powder coating that is electrostatically applied and then baked to bond to substrate.
14. Internal panel mounting studs with hardware, grounding hardware, and sealing washers.
15. Grounding stud on enclosure body.
16. Thermoplastic pocket on inside of door for record Drawings and Product Data.
17. Nominal 4-inch- tall integral lifting base, not less than 0.123 inch thick, with predrilled holes for attachment to mounting surface.
18. Internal rack-mount shelves and angles, as required by application.

H. Freestanding, NEMA 250, Types 4 and 12:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. B-line; Eaton, Electrical Sector.
    b. Hammond Mfg. Co. Inc.
    c. Hoffman; nVent.
    d. Saginaw Control and Engineering.
    e. Or approved equal.

2. NRTL listed in accordance with UL 508A.
3. Seams and joints are continuously welded and ground smooth.
4. Externally formed body flange around perimeter of enclosure face.
5. Type 12 Enclosure Sizes:

    a. Single-door enclosure sizes up to 90 inches tall by 36 inches wide.
    b. Double-door enclosure sizes up to 90 inches tall by 72 inches wide.

6. Type 4 Enclosure Sizes:

    a. Single-door enclosure sizes up to 72 inches tall by 36 inches wide.
    b. Double-door enclosure sizes larger than 36 inches wide.

7. Construct enclosure of steel, not less than 0.093 inch thick.
8. Finish enclosure with polyester powder coating that is electrostatically applied and then baked to bond to substrate.

    a. Exterior Color: Manufacturer's standard.
    b. Interior Color: .

9. Corner-formed door with continuous perimeter oil-resistant gasket supported using continuous piano hinge full length of door.
10. Doors fitted with three-point (top, middle, and bottom) latch system with latching rod rollers and single, heavy-duty, oiltight handle with integral locking mechanism.
11. Removable solid steel internal panel, 0.093 inch thick, with white or gray polyester powder coating that is electrostatically applied and then baked to bond to substrate.
12. Internal panel mounting studs with hardware, grounding hardware, and sealing washers.
13. Grounding stud on enclosure body.
14. Thermoplastic pocket on inside of door for record Drawings and Product Data.
15. Equip top of enclosure with no fewer than two lifting eyes.
16. Internal rack-mount shelves and angles, as required by application.

I. Freestanding, NEMA 250, Type 4X-SS:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Crouse-Hinds; Eaton, Electrical Sector.
    b. Hammond Mfg. Co. Inc.
    c. Hoffman; nVent.
    d. Saginaw Control and Engineering.
    e. Or approved equal.

2. NRTL listed in accordance with UL 508A.
3. Seams and joints are continuously welded and ground smooth.
4. Externally formed body flange around perimeter of enclosure face for continuous perimeter seamless gasket door seal.
5. Construct enclosure of Type 304 or Type 316L stainless steel, not less than the following:

    a. Size Less Than 24 Inches: 0.053 inch thick.

b. Size 24 Inches and Larger: 0.067 inch thick.

6. Outside enclosure and door of enclosure with brushed No. 4 finish.
7. Doors:

   a. Single-door enclosure sizes up to 36 inches wide.
   b. Double-door enclosure sizes larger than 36 inches wide.
   c. Corner-formed door(s) with continuous perimeter oil-resistant gasket, full size of enclosure face, supported using continuous piano hinge full length of door.
   d. Doors fitted with three-point (top, middle, and bottom) latch system with single, heavy-duty, liquidtight, Type 304 or Type 316L stainless steel handle with integral locking mechanism.

8. Removable internal panel of 0.093-inch stainless steel.
9. Internal panel mounting studs and hardware, grounding hardware, and sealing washers.
10. Install corrosion-resistant polyester vent drain in a stainless steel sleeve at bottom of enclosure.
11. Include enclosure with stainless steel mounting brackets.
12. Thermoplastic pocket on inside of door for record Drawings and Product Data.
13. Equip top of enclosure with no fewer than two lifting eyes.
14. Internal rack-mount shelves and angles, as required by application.

J. Accessories:

1. Electric Heater:

   a. Aluminum housing with brushed finish.
   b. Thermostatic control with adjustable set point from 0 to 100 deg F.
   c. Capacity: 100, 200, 400, and 800 W, as required by application.
   d. Fan draws cool air from bottom of enclosure and passes air across thermostat and heating elements before being released into enclosure cavity. Heated air is discharged through the top of heater.

2. Ventilation Fans, Filtered Intake, and Exhaust Grilles:

   a. Number and size of fans, filters, and grilles, as required by specific panel size and selected equipment.
   b. Compact cooling fans engineered for 50,000 hours of continuous operation without lubrication or service.
   c. Fans capable of being installed on any surface and in any position within enclosure for spot cooling or air circulation.
   d. Thermostatic control with adjustable set point from 32 to 140 deg F.
   e. Airflow Capacity at Zero Pressure:

      1) 4-Inch Fan: 100 cfm.
      2) 6-Inch Fan: 240 cfm.
      3) 10-Inch Fan: 560 cfm.

   f. Maximum operating temperature of 158 deg F.
   g. 4-inch fan thermally protected and provided with permanently lubricated ball-bearings.
   h. 6- and 10-inch fans with ball-bearing construction and split capacitor motors thermally protected to avoid premature failure.

i. Dynamically balanced impellers molded from polycarbonate material.
j. Fan furnished with power cord and polarized plug for power connection.
k. Fan brackets, finger guards, and mounting hardware provided with fans to complete installation.
l. Removable Intake and Exhaust Grilles: stainless steel, of size to match fan size and suitable for NEMA 250, Types 1 and 12 enclosures.
m. Filters for NEMA 250, Type 1 Enclosures: Washable aluminum, of size to match intake grille.
n. Filters for NEMA 250, Type 12 Enclosures: Disposable, of size to match intake grille.

3. Air Conditioner:

a. Electric-powered, self-contained, air-conditioning unit specially designed for electrical enclosures to maintain temperature inside enclosure below ambient temperature outside enclosure.
b. Thermostatic control with adjustable set point from 60 to 120 deg F.
c. Enclosure side or top mounting with unit capacity, as required by application.
d. Designed for closed-loop cooling with continuous operation in ambient environments up to 125 deg F.
e. HFC refrigerant.
f. Reusable and washable air filter.
g. High-performance, industrial-grade, and high-efficiency fans.
h. Furnished with power cord and polarized plug for power connection.
i. Condensate management system with base pan side drain.
j. Mounting hardware, gaskets, mounting template, and instruction manual furnished with unit.
k. Outdoor units equipped with head pressure control for low ambient operation, compressor heater, coated condenser coil, and thermostat.

4. Thermoelectric Humidifier:

a. ABS plastic enclosure.
b. Capacity of 8 oz. of water per 24 hours.
c. Built-in drain captures moisture and plastic hose directs moisture to outside enclosure through a drain.
d. Controlled to maintain enclosure relative humidity at adjustable set point.
e. Unit power supply is internally wired to enclosure electrical power source.

5. Framed Fixed Window Kit for NEMA 250, Types 4, 4X, and 12 Enclosures:

a. 0.25-inch- thick, scratch-resistant acrylic or polycarbonate window mounted in a metal frame matching adjacent door material.
b. Enclosure types, except NEMA 250 Type 1, to have continuous gasket material around perimeter of window and frame to provide watertight seal.
c. Window kit to be factory or shop installed before shipment to Project.

6. Frameless Fixed Window Kit for NEMA 250, Type 1 Enclosures:

a. 0.125-inch- thick, polycarbonate window mounted in enclosure door material.
b. Window attached to door with screw fasteners and continuous strip of high-strength, double-sided tape around window perimeter.
c. Window kit is factory or shop installed before shipment to Project.

7. Frame Fixed or Hinged Window Kit for NEMA 250, Types 1 and 12 Enclosures:

    a. 0.25-inch- thick, scratch-resistant acrylic or polycarbonate window mounted in a metal frame matching adjacent door material.
    b. Enclosure types, except NEMA 250 Type 1, to have continuous gasket material around perimeter of window and frame to provide watertight seal.
    c. Window kit to be factory or shop installed before shipment to Project.

8. Bar handle with keyed cylinder lock set.

2.26 RELAYS

A. General-Purpose Relays:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allen Bradley; by Rockwell Automation.
    b. Eaton.
    c. IDEC Corporation.
    d. Omron Americas.
    e. Siemens Industry, Inc., Building Technologies Division.
    f. Square D; Schneider Electric USA.
    g. Or approved equal.

2. NRTL listed.
3. Heavy-duty, electromechanical type; rated for at least 10 A at 250 V ac and 60 Hz.
4. SPDT, DPDT, or three-pole double-throw, as required by control application.
5. Plug-in-style relay with multiblade plug for DPDT relays and multiblade plug for three-pole double-throw relays.
6. Construct contacts of silver, silver alloy, or gold.
7. Enclose relay in a clear transparent polycarbonate dust-tight cover.
8. Include LED indication and push-to-test button to test manual operation of relay without power on coil.
9. Performance:

    a. Mechanical Life: At least 10 million cycles.
    b. Electrical Life: At least 100,000 cycles at rated load.
    c. Pickup Time: 15 ms or less.
    d. Dropout Time: 10 ms or less.
    e. Pull-in Voltage: 85 percent of rated voltage.
    f. Dropout Voltage: 50 percent of nominal rated voltage.
    g. Power Consumption: 2 VA or less.
    h. Ambient Operating Temperatures: Minus 40 to 115 deg F.

10. Equip relays with coil transient suppression to limit transients to non-damaging levels.
11. Plug each relay into industry-standard, 35 mm DIN rail socket. Plug all relays located in control panels into sockets that are mounted on a DIN rail.
12. Include relay socket with screw terminals. Mold into socket the coincident screw terminal numbers.

B. Multifunction Time-Delay Relays:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allen Bradley; by Rockwell Automation.
    b. Eaton.
    c. IDEC Corporation.
    d. Omron Americas.
    e. Siemens Industry, Inc., Building Technologies Division.
    f. Square D; Schneider Electric USA.
    g. Or approved equal.

2. NRTL listed.
3. Continuous-duty type, rated for at least 10 A at 240 V ac and 60 Hz.
4. Relay with up to 4 programmable functions to provide on/off delay, interval, and recycle timing functions.
5. Plug-in-style relay with either multi-pin or blade plug.
6. Construct contacts of silver, silver alloy, or gold.
7. Enclose relay in a dust-tight cover.
8. Include knob and dial scale for alternative digital interface for setting delay time.
9. Visual Status Indication: Power "On" status.
10. Performance:

    a. Mechanical Life: At least 10 million cycles.
    b. Electrical Life: At least 100,000 cycles at rated load.
    c. Timing Ranges: Multiple ranges from 0.1 seconds to 100 minutes.
    d. Repeatability: Within 2 percent.
    e. Recycle Time: 45 ms.
    f. Minimum Pulse-Width Control: 50 ms.
    g. Power Consumption: 5 VA or less.
    h. Ambient Operating Temperatures: Minus 40 to 115 deg F.

11. Equip relays with transient suppression to limit transients to non-damaging levels.
12. Plug each relay into industry-standard, 35 mm DIN rail socket. Plug all relays located in control panels into sockets that are mounted on a DIN rail.
13. Include relay socket with screw terminals. Mold into socket the coincident screw terminal numbers.

C. Latching Relays:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allen Bradley; by Rockwell Automation.
    b. Eaton.
    c. IDEC Corporation.
    d. Omron Americas.
    e. Siemens Industry, Inc., Building Technologies Division.
    f. Square D; Schneider Electric USA.
    g. Or approved equal.

2. NRTL listed.
3. Continuous-duty type, rated for at least 10 A at 250 V ac and 60 Hz.
4. SPDT, DPDT, or three-pole double-throw, as required by control application.
5. Plug-in-style relay with either multi-pin or blade plug.
6. Construct contacts of silver, silver alloy, or gold.
7. Enclose relay in a clear transparent polycarbonate dust-tight cover.
8. Performance:

    a. Mechanical Life: At least 10 million cycles.
    b. Electrical Life: At least 100,000 cycles at rated load.
    c. Pickup Time: 15 ms or less.
    d. Dropout Time: 10 ms or less.
    e. Pull-in Voltage: 85 percent of rated voltage.
    f. Dropout Voltage: 10 percent of nominal rated voltage.
    g. Power Consumption: 2 VA or less.
    h. Ambient Operating Temperatures: Minus 40 to 115 deg F.

9. Equip relays with coil transient suppression to limit transients to non-damaging levels.
10. Plug each relay into industry-standard, 35 mm DIN rail socket. Plug all relays located in control panels into sockets that are mounted on a DIN rail.
11. Relay socket with screw terminals. Mold into socket the coincident screw terminal numbers.

D. Current Sensing Relays:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Eaton.
    b. Functional Devices Inc.
    c. NK Technologies.
    d. Square D; Schneider Electric USA.
    e. Or approved equal.

2. NRTL listed.
3. Monitors ac current.
4. Independent adjustable controls for pickup and dropout current.
5. Energized when supply voltage is present and current is above pickup setting.
6. De-energizes when monitored current is below dropout current.
7. Dropout current is adjustable from 50 to 95 percent of pickup current.
8. Visual indication of contact status.
9. Include current transformer, if required for application.
10. House current sensing relay and current transformer if required in its own enclosure. Use NEMA 250, Type 1 Type 12 enclosure for indoors applications and NEMA 250, Type 4 Type 4X for outdoor applications.

E. Combination On-Off Status Sensor and On-Off Control Relays:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Functional Devices Inc.

b. Veris Industries.
c. IDEC
d. Or approved equal.

2. Description:

a. On-off control and on-off status indication in a single device.
b. LED status indication of activated relay and current trigger.
c. Closed-Open-Auto override switch located on the load side of relay.

3. Performance:

a. Ambient Temperature: Minus 30 to 140 deg F.
b. Voltage Rating: Single-phase loads rated for 300 V ac. Three-phase loads rated for 600 V ac.

4. Status Indication:

a. Current Sensor: Integral sensing for single-phase loads up to 20 A and external solid or split sensing ring for three-phase loads up to 150 A.
b. Current Sensor Range: As required by application.
c. Current Set Point: Fixed or adjustable, as required by application.
d. Current Sensor Output:

1) Solid-state, SPDT contact rated for 30 V ac and dc and for 0.4 A.
2) Solid-state, SPDT contact rated for 120 V ac and 1.0 A.
3) Analog, 0 to 5 or 10 V dc.
4) Analog, 4 to 20 mA, loop powered.

5. Relay: SPDT, continuous-duty coil; rated for 10-million mechanical cycles.
6. Enclosure: NEMA 250, Type 1 Type 12 enclosure for indoor applications; NEMA 250, Type 4 Type 4X enclosure for outdoor applications.

2.27 ELECTRICAL POWER DEVICES

A. Control Transformers:

1. Sizing Criteria: Size control transformers for total connected load, plus additional 25 percent of connected load for future spare capacity.
2. Transformer Minimum Capacity: 40 VA.
3. Protection: Provide transformers with both primary and secondary fuses. Integral circuit breaker is acceptable in lieu of fuses.
4. Enclosure: House control transformers in NEMA 250 enclosures, type as indicated in "Performance Requirements" Article for application.

B. DC Power Supplies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Acopian Technical Company.

b. Emerson Electric Co.
c. IDEC Corporation.
d. Omron Americas.
e. Or approved equal.

2. Description: Linear or switched, regulated power supplies with ac input to multiple dc output(s).

a. Include both line and load regulation to ensure stable output.
b. To protect both power supply and load, include power supply with an automatic current limiting circuit.

3. Features:

a. Connection: Plug-in style suitable for mating with standard 8-pin octal socket. Include power supply with mating mounting socket.
b. Housing: Enclose circuitry in a housing.
c. Local Adjustment: Include screw adjustment on exterior of housing for dc voltage output.
d. Mounting: DIN rail.
e. Visual status indicator.

4. Performance:

a. Input Voltage: Nominally 120 V ac, 60 Hz.
b. Output Voltage: Nominally 24 V dc with plus or minus 1 V dc adjustment.
c. Output Current: Minimum 100 mA.
d. Load Regulation: Within 0.1 percent.
e. Line Regulation: Within 0.05 percent.
f. Stability: Within 0.1 percent of rated volts after warmup period.
g. Ripple: 1 mV rms.

2.28 UNINTERRUPTABLE POWER SUPPLY (UPS) UNITS

A. Furnish local UPS units, of type indicated, installed with Direct Digital Control system.

B. DIN Rail Mounted UPS:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. APC by Schneider Electric.
b. Emerson Electric Co.
c. Phoenix Contact.
d. Or approved equal.

2. Provide continuous, regulated output power without using batteries during brown-out, surge, and spike conditions.
3. Performance:

a. Capacity: Load not to exceed 75 percent of rated capacity.
b. Efficiency: Minimum 94 percent.

c. Input Voltage: Single phase, 120 V ac, compatible with field power source.
d. Load Power Factor Range (Crest Factor): 0.65 to 1.0.
e. Output Voltage: 101 to 132 V ac, while input voltage varies between 89 and 152 V ac.
f. On Battery Output Voltage: Sine wave.
g. Inverter Overload Capacity: Minimum 150 percent for 30 seconds.
h. Battery Backup: 15 minutes of operation at full load with battery power.
i. Battery Recharge Time: Maximum of four hours to 90 percent capacity after full discharge.
j. Transfer Time: 6 ms.
k. Surge Voltage Withstand Capacity: IEEE C62.41.1 and IEEE C62.41.2, Categories A and B.

4. Automatic bypass operation during fault or overload conditions.
5. Integral line-interactive, power condition topology to eliminate all power contaminants.
6. Include power switch and visual indication of power, battery, fault.
7. Include audible alarm of faults with silence feature.
8. Include dry contacts (digital output points) for low battery condition and battery-on (primary utility power failure) and connect points to Direct Digital Control system.
9. Batteries: Sealed; maintenance free; replacement without dropping load.

C. Tower UPS Models through 1000 VA:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. APC by Schneider Electric.
b. Eaton.
c. Toshiba International Corporation.
d. Or approved equal.

2. Provide continuous, regulated output power without using batteries during brown-out, surge, and spike conditions.
3. Performance:

a. Capacity: Load not to exceed 75 percent of rated capacity.
b. Efficiency: Complying with ENERGY STAR requirements; minimum 91 percent.
c. Input Voltage: Single phase, 120 V ac, compatible with field power source.
d. Load Power Factor Range (Crest Factor): 0.65 to 1.0.
e. Output Voltage: 101 to 132 V ac, while input voltage varies between 89 and 152 V ac.
f. On Battery Output Voltage: Sine wave.
g. Inverter Overload Capacity: Minimum 150 percent for 30 seconds.
h. Battery Backup: 15 minutes of operation at full load with battery power.
i. Battery Recharge Time: Maximum of four hours to 90 percent capacity after full discharge to cutoff.
j. Transfer Time: 0 ms.
k. Surge Voltage Withstand Capacity: IEEE C62.41.1 and IEEE C62.41.2, Categories A and B; 6 kV/200 and 500 A; 100 kHz ring wave.

4. Automatic bypass operation during fault or overload conditions.
5. Integral line-interactive, power condition topology to eliminate all power contaminants.
6. Include power switch and visual indication of power, battery, fault, and temperature.
7. Include audible alarm of faults and front panel silence feature.

8. Receptacles: Minimum four, NEMA WD 1, NEMA WD 6 Configuration 5-15R receptacles.
9. Remote Alarms: Include dry contacts (digital output points) for low battery condition and battery-on (primary utility power failure) and connect points to Direct Digital Control system.
10. Batteries: Sealed type; maintenance free. Battery replacement is to be front accessible by user without dropping load.
11. Install tower models in enclosures rated for location.

D. Tower and Rack UPS Models through 3000 VA:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. APC by Schneider Electric.
    b. Eaton.
    c. Toshiba International Corporation.
    d. Or approved equal.

2. NRTL Listing: UL 1778.
3. Provide continuous, regulated output power without using batteries during brown-out, surge, and spike conditions.
4. Performance:

    a. Capacity: Load not to exceed 75 percent of UPS rated capacity.
    b. Efficiency: Complying with ENERGY STAR requirements; minimum 91 percent.
    c. Input Voltage: Single phase, 120 V ac, plus 20 to minus 30 percent.
    d. Power Factor: Minimum 0.95 at full load.
    e. Output Voltage: Single phase, 120 V ac, within 3 percent.
    f. Inverter overload capacity to be minimum 150 percent for 30 seconds.
    g. Battery Backup: 15 minutes of operation at full load with battery power.
    h. Battery Recharge Time: Maximum of 6 hours to 90 percent capacity.
    i. Transfer Time: 0 ms.

5. LCD display with operator interface.
6. Receptacles: Minimum 6, NEMA WD 1, NEMA WD 6 Configuration 5-15R or 5-20R receptacles.
7. Automatic bypass operation during fault or overload conditions.
8. Remote Alarms: Include dry contacts (digital output points) for low battery condition and battery-on (primary utility power failure) and connect points to Direct Digital Control system.
9. Batteries: Sealed; maintenance free.
10. Enclosures: Install tower models in enclosures rated for location. Install rack models installed on matching racks, as applicable to particular installation location and space availability/configuration.

2.29 PRESSURE INSTRUMENT SIGNAL AIR PIPING AND TUBING

A. Products in this article are intended for use with the following:

1. Signal air between pressure instruments, such as sensors, switches, transmitters, controllers, and accessories.

B. Copper Tubing:

1. Seamless phosphor deoxidized copper, drawn tempered, or soft annealed, with chemical and physical properties in accordance with ASTM B75/B75M.
2. Performance, dimensions, weight, and tolerance in accordance with ASTM B280.
3. Diameter, as required by application, not less than nominal 1/4 inch .
4. Wall thickness, as required by application, but not less than 0.030 inch.
5. Copper Tubing Connectors and Fittings - Brass, Compression Type:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) BrassCraft Manufacturing Co.; a Masco company.
        2) DK-LOK USA.
        3) Mid-America Fittings; a Midland Industries Company.
        4) Parker Hannifin Corporation.
        5) Or approved equal.

    b. Single or double ferrule design creating a constant tension between fitting body and fitting nut for leak-free seal.

6. Copper Tubing Connectors and Fittings - Copper, Solder-Joint Type:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Elkhart Products Corporation.
        2) NIBCO INC.
        3) Paul Mueller Company.
        4) Or approved equal.

    b. Copper Solder-Joint Fittings: Cast, ASME B16.18 or wrought, ASME B16.22.

C. Galvanized-Steel Piping (for Pneumatic/Pressure Instrument Signal Air):

1. Pipe: ASTM A53/A53M, Schedule 40.
2. Fittings: Galvanized malleable iron, ASME B16.3, Class 150.

D. Polyethylene Tubing (for Pneumatic/Pressure Instrument Signal Air):

1. Fire-resistant, black virgin polyethylene in accordance with ASTM D1248, Type 1, Class C, and Grade 5.
2. Complying with stress crack test in accordance with ASTM D1693.
3. Diameter, as required by application, of not less than nominal 1/4 inch.
4. Polyethylene Tubing Connectors and Fittings - Brass, Barb Fittings:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) BrassCraft Manufacturing Co.; a Masco company.
        2) DK-LOK USA.

3) Mid-America Fittings; a Midland Industries Company.
4) Parker Hannifin Corporation.
5) Or approved equal.

b. Tapered and beaded hose barbs of push-on design; intended for low-pressure applications only.

5. Polyethylene Tubing Connectors and Fittings - Brass, Compression Type:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) BrassCraft Manufacturing Co.; a Masco company.
2) DK-LOK USA.
3) Mid-America Fittings; a Midland Industries Company.
4) Parker Hannifin Corporation.
5) Or approved equal.

b. Specially designed for jointing polyethylene tubing to provide leak-free seal without twisting or weakening polyethylene tubing.

2.30 PROCESS TUBING

A. Products in this article are intended for signals to instruments connected to liquid and steam systems.

B. Copper Tubing:

1. Seamless phosphor deoxidized copper, drawn tempered with chemical and physical properties in accordance with ASTM B75/B75M.
2. Performance, dimensions, weight, and tolerance in accordance with ASTM B280.
3. Diameter, as required by application, of not less than nominal 3/8 inch .
4. Wall thickness, as required by application, but not less than 0.030 inch.
5. Copper Tubing Connectors and Fittings (for Process Tubing) - Brass, Compression Type:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) BrassCraft Manufacturing Co.; a Masco company.
2) DK-LOK USA.
3) Mid-America Fittings; a Midland Industries Company.
4) Parker Hannifin Corporation.
5) Or approved equal.

b. Single or double ferrule design creating a constant tension between fitting body and fitting nut for leak-free seal.

6. Copper Tubing Connectors and Fittings (for Process Tubing) - Brass, Solder-Joint Type:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Elkhart Products Corporation.
2) Mueller Streamline Co.; a company of Mueller Industries.
3) NIBCO INC.
4) Or approved equal.

b. Copper Solder-Joint Fittings: Cast, ASME B16.18 or wrought, ASME B16.22.

C. Stainless Steel Tubing (for Process Tubing):

1. Seamless Type 316 stainless steel, Grade TP, cold drawn, annealed and pickled, and free from scale.
2. Chemical and physical properties in accordance with ASTM A269/A269M.
3. Diameter, as required by application, of not less than nominal 3/8 inch .
4. Wall thickness, as required by application, but not less than 0.035 inch.
5. Furnish stainless steel tubing in 20 ft. straight random lengths.

D. Stainless Steel Tubing Connectors and Fittings (for Process Tubing) - Stainless Steel, Compression Type:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DK-LOK USA.
b. Parker Hannifin Corporation.
c. Sizto Tech Corporation (STC).
d. Or approved equal.

2. Connectors and fittings constructed from Type 316 stainless steel, with collets, flareless type.
3. Single or double ferrule design creating a constant tension between fitting body and fitting nut for leak-free seal.
4. Connect instruments to tubing with connectors having compression connector on one end and IPS or NPT thread on other end.

2.31 CONTROL WIRE AND CABLE

A. Wire: Single conductor control wiring above 24 V.

1. Wire Size: Minimum 18 AWG.
2. Conductors: 7/24 soft annealed copper strand with 2- to 2.5-inch lay.
3. Conductor Insulation: 600 V, Type THWN or Type THHN, and 90 deg C in accordance with UL 83.
4. Conductor Insulation Colors: Black (hot), white (neutral), and green (ground).
5. Furnish on spools.

B. Single, Twisted-Shielded, Instrumentation Cable above 24 V:

1. Wire Size: Minimum 22 AWG.
2. Conductors: Twisted, 7/24 soft annealed copper strand with a 2- to 2.5-inch lay.
3. Conductor Insulation: Type THHN/THWN or Type TFN rating.
4. Conductor Insulation Colors:

a. Twisted Pair: Black and white.

b. Twisted Triad: Black, red, and white.

5. Shielding: 100 percent type, 0.35/0.5-mil aluminum/Mylar tape, helically applied with 25 percent overlap, and aluminum side in with tinned copper drain wire.
6. Outer Jacket Insulation: 600 V, 90 deg C rating, and Type TC cable.
7. Furnish on spools.

C. Single, Twisted-Shielded, Instrumentation Cable 24 V and Less:

1. Wire Size: Minimum 22 AWG.
2. Conductors: Twisted, 7/24 soft annealed copper stranding with a 2- to 2.5-inch lay.
3. Conductor Insulation: Nominal 15-mil thickness, constructed from flame-retardant PVC.
4. Conductor Insulation Colors:

a. Twisted Pair: Black and white.
b. Twisted Triad: Black, red, and white.

5. Shielding: 100 percent type, 1.35-mil aluminum/polymer tape, helically applied with 25 percent overlap, and aluminum side in with tinned copper drain wire.
6. Outer Jacket Insulation: 300 V, 105 deg C rating, and Type PLTC cable.
7. Furnish on spools.

D. LAN and Communication Cable: Comply with Direct Digital Control system manufacturer requirements for network being installed.

1. Comply with following requirements for balanced twisted pair cable described in Section 271513 "Communications Copper Horizontal Cabling."

a. Plenum rated.
b. Unique color that is different from other cables used on Project.

2.32 RACEWAYS

A. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" for electrical power raceways and boxes.

B. Comply with requirements in Section 270528.36 "Cable Trays for Communications Systems" for raceways for balanced twisted pair cables and optical fiber cables.

2.33 ACCESSORIES

A. Pressure Electric Switches:

1. Description: Diaphragm-operated, snap-acting switch.
2. Performance:

a. Rating: Resistance loads at 120 V ac.
b. Set Point: Adjustable from 3 to 20 psig.
c. Differential: Adjustable from 2 to 6 psig.

3. Body and Switch Housing: Metal.

B. Control Damper Blade Limit Switches:

1. Application: Sense positive open and/or closed position of damper blades.
2. NEMA 250, Type 13, oiltight construction. Install in instrument enclosure where required for additional environmental protection.
3. Arrange for mounting application, and to prevent "over-center" operation.

C. I/P and E/P Transducers:

1. Commercial Grade:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) ControlAir, Inc.
2) Dwyer Instruments, Inc.
3) KMC Controls, Inc.
4) MAMAC Systems, Inc.
5) Or approved equal.

b. Description: Transducer converting an electronic current (I) or voltage (E) AO signal to a proportional or stepped pneumatic signal. Unless otherwise required by operating sequence, use 3 to 15 psig pneumatic signal for pneumatic actuation.

c. Features:

1) Auto/manual output switch, manual output control, and output pressure gauge.
2) Separate zero and span calibration adjustments.

d. Performance:

1) Accuracy: Within 1.0 percent of output span.
2) Linearity: Within 0.5 percent of output span.
3) Output Capacity: Not less than 550 scim at 15 psig.
4) Maximum Pressure: 30 psig of supply pressure without damage.
5) Vibration: Construct entire assembly so that shock and vibration will not harm transducer or affect accuracy.

e. Applications:

1) Terminal Units: Fan-coil units, VAV units, and unit heaters.

D. E/P Switch:

1. Body: Cast aluminum or brass; three pipe body (common, normally open, and normally closed).
2. Internal Components: Brass, copper, steel, or stainless steel.
3. Connections: Barb, or threaded for mating to compression fittings.

4. Rating: 30 psig when installed in systems below 25 psig; 150 psig when installed in systems above 25 psig.
5. Features: Include coil transient suppression.

E. Instrument Enclosures:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hammond Mfg. Co. Inc.
    b. Hoffman; nVent.
    c. Saginaw Control and Engineering.
    d. Or approved equal.

2. Application: Include instrument enclosure for secondary protection to comply with requirements indicated in "Performance Requirements" Article.
3. Certification: NRTL listed and labeled to UL 50 or UL 508A as applicable.
4. Subpanel:

    a. Size enclosure with least 25 percent spare area on subpanel.
    b. Mount instrument(s) within enclosure on internal subpanel(s).

5. Identification: Include on face of enclosure an engraved, laminated phenolic nameplate for each instrument installed within enclosure.
6. Pneumatic Pressure Gauges: Include main pressure gauge and a branch pressure gauge for each pneumatic device installed inside enclosure.
7. Raceways: For enclosures housing multiple instruments, route tubing, cable, and wiring within enclosure in a raceway having continuous removable cover.
8. Access: Provide enclosures larger than 12 inches with hinged full-size face cover.
9. Security: Equip enclosures with lock and common key.

F. Manual Valves:

1. Brass Needle Valves:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) BrassCraft Manufacturing Co.; a Masco company.
        2) Parker Hannifin Corporation.
        3) Weksler
        4) Or approved equal.

    b. Pressure Rating: 150 psig.
    c. Temperature Rating: 250 deg F.
    d. Body: Brass.
    e. Seat: Brass.
    f. Handle: Aluminum, brass, or stainless steel T-bar handle.
    g. Connections: Include tubing connections.
    h. Applications: Copper and polyethylene pneumatic tubing.

2. Stainless Steel Needle Valves:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) DK-LOK USA.
      2) Parker Hannifin Corporation.
      3) Sizto Tech Corporation (STC).
      4) Or approved equal.

   b. Pressure Rating: 5000 psig.
   c. Temperature Rating: 450 deg F.
   d. Body: Type 316 stainless steel.
   e. Seat: Type 316 stainless steel.
   f. Packing: PTFE.
   g. Handle: Aluminum or stainless steel T-bar handle.
   h. Connections: Include tubing connections.
   i. Applications: Copper pneumatic tubing; copper and stainless steel process tubing.

3. Bronze Body Ball Valves:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Apollo Valves; a part of Aalberts Integrated Piping Systems.
      2) Milwaukee Valve Company.
      3) NIBCO INC.
      4) Or approved equal.

   b. Standard: MSS SP-110.
   c. SWP Rating: 150 psig.
   d. CWP Rating: 600 psig.
   e. Body Design: Two piece.
   f. Body Material: Bronze.
   g. Ends: Threaded.
   h. Seats: PTFE.
   i. Stem: Stainless steel.
   j. Ball: Stainless steel, vented.
   k. Handle: Stainless steel with vinyl grip.
   l. Port: Full.

2.34 IDENTIFICATION

A. Instrument Air Pipe and Tubing:

   1. Engraved tag bearing the following information:

      a. Service (Example): "Instrument Air."

b. Pressure Range (Example): 0 to 30 psig.

2. Letter size minimum of 0.25 inch high.
3. Engraved phenolic consisting of three layers of rigid laminate. Top and bottom layers color-coded blue with contrasting white center exposed by engraving through outer layer.
4. Include tag with brass grommet, chain, and S-hook.

B. Control Equipment, Instruments, and Control Devices:

1. Laminated acrylic or melamine plastic sign bearing unique identification.

a. Include instruments with unique identification identified by equipment being controlled or monitored, followed by point identification.

2. Letter size as follows:

a. Servers: Minimum of 0.5 inch high.
b. Direct Digital Control Controllers: Minimum of 0.5 inch high.
c. Gateways: Minimum of 0.5 inch high.
d. Repeaters: Minimum of 0.5 inch high.
e. Enclosures: Minimum of 0.5 inch high.
f. Electrical Power Devices: Minimum of 0.25 inch high.
g. UPS units: Minimum of 0.5 inch high.
h. Accessories: Minimum of 0.25 inch high.
i. Instruments: Minimum of 0.25 inch high.
j. Control Damper and Valve Actuators: Minimum of 0.25 inch high.

3. Engraved phenolic consisting of three layers of rigid laminate. Top and bottom layers color-coded black with contrasting white center exposed by engraving through outer layer.
4. Fastened with drive pins.
5. Instruments, control devices, and actuators with Project-specific identification tags having unique identification numbers following requirements indicated and provided by original manufacturer do not require additional identification.

C. Valve Tags:

1. Brass tags and brass chains attached to valve.
2. Tag Size: Minimum 1.5 inches in diameter.
3. Include tag with unique valve identification indicating control influence such as flow, level, pressure, or temperature; followed by location of valve, and followed by three-digit sequential number. For example: TV-1.001.
4. Valves with Project-specific identification tags having unique identification numbers following requirements indicated and provided by original manufacturer do not require an additional tag.

D. Raceway and Boxes:

1. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
2. Paint cover plates on junction boxes and conduit same color as tape banding for conduits. After painting, label cover plate "HVAC Controls" using engraved phenolic tag.

E. Equipment Warning Labels:

1. Self-adhesive label with pressure-sensitive adhesive back and peel-off protective jacket.
2. Lettering size at least 14-point type with white lettering on red background.
3. Warning label to read "CAUTION-Equipment operated under remote automatic control and may start or stop at any time without warning. Switch electric power disconnecting means to OFF position before servicing."
4. Lettering to be enclosed in a white line border. Edge of label is to extend at least 0.25 inch beyond white border.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates.

B. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

C. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

D. Examine walls, floors, roofs, and ceilings for suitable conditions where product will be installed.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 DIRECT DIGITAL CONTROL SYSTEM INTERFACE WITH OTHER SYSTEMS AND EQUIPMENT

A. Communication Interface to Equipment with Integral Controls:

1. Direct Digital Control system has communication interface with equipment having integral controls and having communication interface for remote monitoring or control.
2. Equipment to Be Connected:

a. Domestic water heaters specified in Section 223300 "Electric, Domestic-Water Heaters"
b. Air-terminal units specified in Section 233600 "Air Terminal Units."
c. Boilers specified in Section 235216 "Condensing Boilers."

d. Roof-top units specified in Section 237416.13 "Packaged, Large-Capacity, Rooftop Air-Conditioning Units."
e. Variable refrigerant flow units specified in Section 238129 "Variable-Refrigerant-Flow HVAC Systems."
f. Fan-coil units specified in Section 238219 "Fan Coil Units."
g. Variable-frequency controllers specified in Section 262923 "Variable-Frequency Motor Controllers."

B. Communication Interface to Other Building Systems:

1. Direct Digital Control system communicates with systems having communication interface.
2. Systems to Be Connected:

a. Power monitoring specified in Section 260913 "Electrical Power Monitoring."
b. Fire-alarm system specified in Section 284621.11 "Addressable Fire-Alarm Systems."

3.4 CONTROL DEVICES FOR INSTALLATION BY INSTALLERS

A. Deliver selected control devices, specified in indicated HVAC instrumentation and control device Sections, to identified equipment and systems manufacturers for factory installation and to identified installers for field installation.

B. Deliver the following to duct fabricator and Installer for installation in ductwork. Include installation instructions to Installer and supervise installation for compliance with requirements.

1. Control dampers, which are specified in Section 230923.12 "Control Dampers."
2. Airflow sensors and switches, which are specified in Section 230923.14 "Flow Instruments."
3. Pressure sensors, which are specified in Section 230923.23 "Pressure Instruments."

C. Deliver the following to plumbing and HVAC piping installers for installation in piping. Include installation instructions to Installer and supervise installation for compliance with requirements.

1. Control valves, which are specified in Section 230923.11 "Control Valves."
2. Pipe-mounted flow meters, which are specified in Section 230923.14 "Flow Instruments."
3. Pipe-mounted sensors, switches, and transmitters. Flow meters are specified in Section 230923.14 "Flow Instruments."
4. Tank-mounted sensors, switches, and transmitters. Pressure sensors, switches, and transmitters are specified in Section 230923.23 "Pressure Instruments."
5. Liquid temperature sensors, switches, and transmitters are specified in Section 230923.27 "Temperature Instruments."
6. Pipe- and tank-mounted thermowells. Liquid thermowells are specified in Section 230923.27 "Temperature Instruments."

3.5 CONTROL DEVICES FOR EQUIPMENT MANUFACTURER FACTORY INSTALLATION

A. Deliver the following to air-handling unit manufacturer for factory installation. Include installation instructions to air-handling unit manufacturer.

1. Programmable application controller.
2. Unit-mounted Direct Digital Control control dampers and actuators, which are specified in Section 230923.12 "Control Dampers."
3. Unit-mounted airflow sensors, switches, and transmitters, which are specified in Section 230923.14 "Flow Instruments."
4. Unit-mounted gas sensors, and transmitters, which are specified in Section 230923.16 "Gas Instruments."
5. Unit-mounted leak-detection switches, which are specified in Section 230923.18 "Leak Detection Instruments."
6. Unit-mounted pressure sensors, switches, and transmitters, which are specified in Section 230923.23 "Pressure Instruments."
7. Unit-mounted temperature sensors, switches, and transmitters. Air-temperature sensors, switches, and transmitters are specified in Section 230923.27 "Temperature Instruments."
8. Relays.

B. Deliver the following to terminal unit manufacturer for factory installation. Include installation instructions to terminal unit manufacturer.

1. Programmable application or application-specific controller.
2. Electric damper actuator. Damper actuators are specified in Section 230923.12 "Control Dampers."
3. Unit-mounted flow and pressure sensors, transmitters, and transducers. Flow sensors, transmitters, and transducers are specified in Section 230923.14 "Flow Instruments." Pressure sensors, switches, and transmitters are specified in Section 230923.23 "Pressure Instruments."
4. Unit-mounted temperature sensors. Air-temperature sensors, switches, and transmitters are specified in Section 230923.27 "Temperature Instruments."
5. Relays.

C. Deliver the following to fan-coil unit manufacturer for factory installation. Include installation instructions to fan-coil unit manufacturer.

1. Programmable application or application-specific controller.
2. Unit-mounted temperature sensors. Air-temperature sensors, switches, and transmitters are specified in Section 230923.27 "Temperature Instruments."
3. Flow and pressure switches. Air and liquid flow sensors, transmitters, and transducers are specified in Section 230923.14 "Flow Instruments." Pressure sensors, switches, and transmitters are specified in Section 230923.23 "Pressure Instruments."
4. Leak-detection switches, which are specified in Section 230923.18 "Leak Detection Instruments."
5. Relays.

3.6 GENERAL INSTALLATION REQUIREMENTS

A. Install products to satisfy more stringent of all requirements indicated.

B. Install products level, plumb, parallel, and perpendicular with building construction.

C. If 2014 New York City Building Codes and referenced standards are more stringent than requirements indicated, comply with requirements in the 2014 New York City Building Codes and referenced standards.

D. Fabricate openings and install sleeves in ceilings, floors, roof, and walls required by installation of products. Before proceeding with drilling, punching, and cutting, check for concealed work to avoid damage. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

E. Firestop Penetrations Made in Fire-Rated Assemblies: Comply with requirements in Section 078413 "Penetration Firestopping."

F. Seal penetrations made in acoustically rated assemblies. Comply with requirements in Section 079200 "Joint Sealants."

G. Welding Requirements:

1. Restrict welding and burning to supports and bracing.
2. No equipment is cut or welded without approval. Welding or cutting will not be approved if there is risk of damage to adjacent Work.
3. Welding, where approved, is to be by inert-gas electric arc process and is to be performed by qualified welders in accordance with applicable welding codes.
4. If requested on-site, show satisfactory evidence of welder certificates indicating ability to perform welding work intended.

H. Fastening Hardware:

1. Wrenches, pliers, and other tools that damage surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening fasteners.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

I. If product locations are not indicated, install products in locations that are accessible and that will permit service and maintenance from floor, equipment platforms, or catwalks without removal of permanently installed furniture and equipment.

3.7 INSTALLATION OF WORKSTATIONS

A. Desktop Workstation Installation:

1. Install workstation(s) at location(s) indicated on Drawings.
2. Install multiple-receptacle power strip with cord for use in connecting multiple workstation components to a single, duplex, electrical power receptacle.
3. Install Direct Digital Control system software on workstation(s) and verify that software functions properly.
4. Develop Project-specific graphics, trends, reports, logs, and historical database.
5. Power each workstation through a dedicated UPS unit. Locate UPS adjacent to workstation.

B. Color Graphics Application:

1. Use system schematics indicated on Drawings as starting point to create graphics.
2. Develop Project-specific library of symbols for representing system equipment and products.

3. Incorporate digital images of Project-completed installation into graphics where beneficial to enhance effect.
4. Submit sketch of graphic layout with description of all text for each graphic for Commissioner's review before creating graphic using graphics software.
5. Seek Commissioner's input in graphics development once using graphics software.
6. Make final editing on-site with Commissioner's review and feedback.
7. Refine graphics as necessary for Commissioner acceptance.
8. On receiving Commissioner acceptance, print a PDF file of each graphic and include with softcopy of Direct Digital Control system operation and maintenance manual.

3.8 INSTALLATION OF SERVERS

A. Install server(s) at location(s) indicated on Drawings.

B. Install number of servers required to suit requirements indicated. Review Project requirements and indicate layout of proposed server location in Shop Drawings.

C. Install software indicated on server(s) and verify that software functions properly.

D. Develop Project-specific graphics, trends, reports, logs, and historical database.

E. Power servers through dedicated UPS unit. Locate UPS adjacent to server. Install rack-mounted UPS units for powering rack-mounted servers and tower UPS units for tower servers.

3.9 INSTALLATION OF PRINTERS

A. Install printers at location(s) indicated on Drawings.

B. Install applicable printer software on workstations and verify that software functions properly.

3.10 INSTALLATION OF GATEWAYS

A. Install gateways if required for Direct Digital Control system communication interface requirements indicated.

B. Test gateways to verify that communication interface functions properly.

3.11 INSTALLATION OF ROUTERS

A. Install routers if required for Direct Digital Control system communication interface requirements indicated.

B. Test routers to verify that communication interface functions properly.

3.12 INSTALLATION OF CONTROLLERS

A. Install controllers in enclosures to comply with indicated requirements.

B. Connect controllers to field power supply.

C. Install controllers with latest version of applicable software and configure to execute requirements indicated.

D. Test and adjust controllers to verify operation of connected I/O to achieve performance indicated requirements while executing sequences of operation.

E. Installation of Network Controllers:

1. Direct Digital Control system provider and Direct Digital Control system manufacturer to determine quantity and location of network controllers to satisfy requirements indicated.
2. Install controllers in a protected location that is easily accessible by operators.
3. Locate top of controller within 72 inches of finished floor.

F. Installation of Programmable Application Controllers:

1. Direct Digital Control system provider and Direct Digital Control system manufacturer to determine quantity and location of programmable application controllers to satisfy requirements indicated.
2. Install controllers in a protected location that is easily accessible by operators.
3. Locate top of controller within 72 inches of finished floor, except where dedicated controllers are installed at terminal units.

G. Application-Specific Controllers:

1. Direct Digital Control system provider and Direct Digital Control system manufacturer to determine quantity and location of application-specific controllers to satisfy requirements indicated.
2. For controllers not mounted directly on equipment being controlled, install controllers in a protected location that is easily accessible by operators.

3.13 INSTALLATION OF WIRELESS ROUTERS FOR OPERATOR INTERFACE

A. Install wireless routers to achieve optimum performance and best possible coverage.

B. Mount wireless routers in a protected location that is within 60 inches of floor and easily accessible by operators.

C. Connect wireless routers to field power supply and to UPS units if network controllers are powered through UPS units.

D. Install wireless router with latest version of applicable software and configure wireless router with security and password protection. Create access password with not less than 12 characters consisting of letters and numbers and at least one special character. Document password in operations and maintenance manuals for reference by operators.

E. Test and adjust wireless routers for proper operation with all types (such as, laptops, smartphones, and tablets) of wireless devices intended for use by operators.

3.14 INSTALLATION OF ENCLOSURES

A. Install the following items in enclosures, to comply with indicated requirements:

1. Gateways.
2. Routers.
3. Controllers.
4. Electrical power devices.
5. UPS units.
6. Relays.
7. Accessories.
8. Instruments.

B. Attach wall-mounted enclosures to wall using the following types of steel struts:

1. For NEMA 250, Type 1 Enclosures: Use painted steel strut and hardware.
2. For NEMA 250, Type 4X Enclosures and Enclosures Located Outdoors: Use stainless steel strut and hardware.
3. Install plastic caps on exposed cut edges of strut.

C. Align top of adjacent enclosures of like size.

D. Install floor-mounted enclosures located in mechanical equipment rooms on concrete housekeeping pads. Attach enclosure legs using galvanized-steel anchors.

E. Install continuous and fully accessible wireways to connect conduit, wire, and cable to multiple adjacent enclosures. Wireways used for application are to have protection equal to NEMA 250 rating of connected enclosures.

3.15 ELECTRIC POWER CONNECTIONS

A. Connect electrical power to Direct Digital Control system products requiring electrical power connections.

B. Direct Digital Control system provider must provide engineering services for the design of electrical power to products not indicated with electric power. System provider must provide a fully functioning Direct Digital Control system. Work is to comply with NFPA 70 and other requirements indicated.

C. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical power conductors and cables.

3.16 INSTALLATION OF IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements in Section 260553 "Identification for Electrical Systems" for identification products and installation.

B. Install laminated acrylic or melamine plastic signs with unique identification on face for each of the following:

1. Server.
2. Gateway.
3. Router.
4. Protocol analyzer.
5. Direct Digital Control controller.
6. Enclosure.
7. Electrical power device.
8. UPS unit.
9. Accessory.

C. Install unique instrument identification for each instrument connected to Direct Digital Control controller.

D. Install unique identification for each control damper and valve actuator connected to Direct Digital Control controller.

E. Where product is installed above accessible tile ceiling, also install matching identification on face of ceiling grid located directly below.

F. Where product is installed above an inaccessible ceiling, also install identification on face of access door directly below.

G. Warning Labels and Signs:

1. Permanently attach to equipment that can be automatically started by Direct Digital Control control system.
2. Locate where highly visible near power service entry points.

3.17 INSTALLATION OF NETWORKS

A. Install optical fiber cable when connecting between the following network devices and when located in different buildings on campus, or when distance between devices exceeds 100m.:

1. Operator workstations.
2. Operator workstations and network controllers.
3. Network controllers.

B. Install balanced twisted pair or optical fiber cable when connecting between the following network devices located in same building:

1. Operator workstations.
2. Operator workstations and network controllers.
3. Network controllers.

C. Install balanced twisted pair or copper cable (as required by equipment) when connecting between the following:

1. Gateways.
2. Gateways and network controllers or programmable application controllers.

3. Routers.
4. Routers and network controllers or programmable application controllers.
5. Network controllers and programmable application controllers.
6. Programmable application controllers.
7. Programmable application controllers and application-specific controllers.
8. Application-specific controllers.

D. Install cable in continuous raceway.

1. Where indicated on Drawings, cable trays may be used for copper cable in lieu of conduit.

3.18 NETWORK NAMING AND NUMBERING

A. Coordinate with Commissioner and provide unique naming and addressing for networks and devices.

B. ASHRAE 135 Networks:

1. MAC Address:

a. Assign and document a MAC address unique to its network for every network device.
b. Ethernet Networks: Document MAC address assigned at its creation.
c. MS/TP Networks: Assign from 00 to 64.

2. Network Numbering:

a. Assign unique numbers to each new network.
b. Provide ability for changing network number through device switches or operator interface.
c. Direct Digital Control system, with all possible connected LANs, can contain up to 65,534 unique networks.

3. Device Object Identifier Property Number:

a. Assign unique device object identifier property numbers or device instances for each device network.
b. Provide for future modification of device instance number by device switches or operator interface.
c. LAN is to support up to 4,194,302 unique devices.

4. Device Object Name Property Text:

a. Device object name property field to support 32 minimum printable characters.
b. Assign unique device "Object Name" property names with plain-English descriptive names for each device.

1) Example 1: Device object name for device controlling heating water boiler plant at Building 1000 would be "Heating Water System Bldg. 1000."
2) Example 2: Device object name for VAV terminal unit controller could be "VAV Unit 102."

5. Object Name Property Text for Other Than Device Objects:

   a. Object name property field is to support 32 minimum printable characters.
   b. Assign object name properties with plain-English names descriptive of application.

      1) Example 1: "Zone 1 Temperature."
      2) Example 2 "Fan Start and Stop."

6. Object Identifier Property Number for Other Than Device Objects:

   a. Assign object identifier property numbers according to Drawings indicated.
   b. If not indicated, object identifier property numbers may be assigned at Installer's discretion but must be approved by Commissioner in advance, be documented, and be unique for like object types within device.

3.19 INSTALLATION OF AIR SIGNAL PIPING AND TUBING

A. Air Signal Piping and Tubing Installation:

1. Material Application:

   a. Install copper tubing, except as follows:

      1) Tubing Exposed to View: Polyethylene tubing installed in raceways may be used in lieu of copper tubing.
      2) Concealed Tubing: Polyethylene tubing may be used in lieu of copper tubing when concealed behind accessible ceilings.

   b. Install copper tubing for sizes up through NTS 1 and install galvanized-steel pipe for larger sizes, except as follows:

      1) Tubing Exposed to View: Polyethylene tubing installed in raceways may be used in lieu of copper tubing where exposed to view.
      2) Concealed Tubing: Polyethylene tubing may be used in lieu of copper tubing when concealed behind accessible ceilings.

   c. Pneumatic Tubing: Install copper tubing for pneumatic main and control signals to instruments including, but not limited to, the following:

      1) Sensors.
      2) Switches.
      3) Transmitters.

   d. Install copper tubing for air signals to instruments including, but not limited to, the following:

      1) Sensors.
      2) Switches.
      3) Transmitters.

e. Install drawn-temper copper tubing, except within 36 inches of device terminations tubing is to be annealed-tempered copper tubing.
f. Install compression fittings to connect copper tubing to instruments, control devices, and accessories.
g. Install compression fittings to connect polyethylene tubing to instruments, control devices, and accessories.

2. Routing:

a. Do not expose tubing in finished spaces, such as spaces with ceilings; occupied spaces, offices, and conference rooms, unless expressly approved in writing by Commissioner. Tubing may be exposed in areas without ceilings.
b. Where tubing is installed in finished occupied spaces, install the tubing in surface metal raceway with appropriate fittings only where not feasible to conceal in wall, above ceiling, or behind architectural enclosures or covers.
c. Install piping and tubing plumb and parallel to and at right angles with building construction.
d. Install multiple runs of tubing or piping in equally spaced parallel lines.
e. Install piping and tubing not to interfere with access to valves, equipment, duct, and equipment access doors, or obstruct personnel access and passageways of any kind.
f. Coordinate with other trades before installation to prevent proposed piping and tubing from interfering with pipe, duct, terminal equipment, light fixtures, conduit, and cable tray space. If changes to Shop Drawings are necessary due to field coordination, document changes on Record Drawings.
g. Install vibration loops in copper tubing when connecting to instruments and actuators that vibrate.

3. Support:

a. Space supports in accordance with MSS SP-58, except support spacing not to exceed 60 inches.
b. Support copper tubing with copper hangers, clips, and tube trays.
c. Do not use tape for support or dielectric isolation.
d. Install supports at each change in direction and at each branch take-off.
e. Attached supports to building structure independent of work of other trades. Support from ducts, pipes, cable trays, and conduits is prohibited.
f. Attached support from building structure with threaded rods, structural shapes, or channel strut.
g. Install and brace supports to carry static load plus a safety margin, which will allow tubing to be serviced.
h. Brace supports to prevent lateral movement.
i. Paint steel support members that are not galvanized or zinc coated.
j. Support polyethylene tubing same as copper tubing.

4. Do not attach piping and tubing to equipment that may be removed frequently for maintenance or that may impart vibration and expansion from temperature change.
5. Protect exposed tubing in mechanical equipment rooms and similar utility spaces from mechanical damage within 96 inches above floor. Use aluminum channel reversed and secured over tubing to protect tubing from damage.
6. Joining and Makeup:

a. Where joining and mating dissimilar metals where galvanic action could occur, install dielectric isolation.
b. Install dirt leg with an isolation valve and threaded plug at each main air, connection to panel, pneumatic pilot positioner, and PRV station.
c. Make threaded joints for connecting to instrument equipment with connectors with a compression tubing connector on one end and threaded connection on the other end.
d. Make tubing bends with tube-bending tool. Hard-bends or wrinkled or flattened bends are unacceptable.
e. Install tube fittings in accordance with manufacturer's written instructions.
f. Do not make tubing connections to a fitting before completing makeup of the connection.
g. Align tubing with fitting. Avoid springing tube into position; this may result in excessive stress on both tubing and fitting with possible resulting leaks.
h. Do not install fittings close to a bend. A length of straight tubing, not deformed by bending, is required for proper connection.
i. Check tubing for correct diameter and wall thickness.
j. Cut tube ends square and deburr. Exercise care during cutting to keep tubing round.
k. Thread pipe on a threading machine. Ream inner edges of pipe ends, and file and grind to remove burrs.
l. Wrap pipe threads with single wrap of PTFE tape.
m. Protect piping and tubing from entrance of foreign matter.

7. Do not exceed 50 percent fill capacity where tubing is installed in conduit. Support conduit in accordance with NFPA 70 unless otherwise indicated.

B. Below-Grade Air Signal Piping and Tubing Installation:

1. Install tubing below-grade in a continuous Schedule 80, PVC conduit.
2. Do not exceed 50 percent fill capacity; minimum size 2 inches.
3. Install top of conduit at depth of at least 24 inches below finished grade.
4. Install tubing in raceways dedicated to only tubing. Do not combine electrical conductors and tubing in raceways.

C. Identify above-grade piping and tubing as follows:

1. Every 50 ft. of straight run.
2. At least once for each branch within 36 inches of main tee.
3. At each change in direction.
4. Within 36 inches of each ceiling, floor, roof, and wall penetration.
5. Where exposed to and where concealed from view, including above ceiling plenums, shafts, and chases.
6. At each valve.
7. Mark each instrument tube connection with a number-coded identification. Each unique tube is to have same unique number at instrument connection and termination at opposite end of tube.
8. Install needle valves for isolation and throttling applications. Option to install ball valves in lieu of needle valves for isolation only applications.

3.20 INSTALLATION OF PROCESS TUBING

A. Install process tubing for signal to instruments in liquid and steam systems. Instruments include, but are not limited to, the following:

1. Meters.
2. Sensors.
3. Switches.
4. Transmitters.

B. Support tubing in accordance with MSS SP-58, but at intervals no more than 60 inches apart.

C. Install minimum NPS 1/2 process tubing for industrial-grade sensors, transmitters, and switches. Install bushings where required.

D. Make smooth tubing bends with a bending tool. Flattened or wrinkled bends are unacceptable.

E. Support tubing independent of other trades.

F. Route tubing parallel to and at right angles to building construction.

G. Install tubing concealed in areas with ceilings.

H. Install dirt leg with an isolation valve and threaded plug in drain valve at each connection to a transmitter and switch.

I. Insulate process piping and tubing connected to hot water and steam systems for personnel protection if surface temperature exceeds 120 deg F. Only insulate piping and tubing within maintenance personnel reach from floor, platform, or catwalk.

J. Wrap pipe threads of fitting in process tubing with service temperatures below 350 deg F with single wrap of PTFE tape.

K. Coat pipe threads of fittings on process tubing in services with temperatures exceeding 350 deg F with pipe compound before being made up to reduce possibility of galling.

L. Do not make tubing connections to a fitting before completing makeup of connection.

M. Check tubing for correct diameter and wall thickness. Cut the tube ends square and deburred. Exercise care during cutting to keep tubing round.

N. Do not install fittings close to a bend. Straight length of tubing, not deformed by bending, is required for proper connection.

O. Align tubing with fitting when installed. Avoid springing tube into position.

P. Install tubing with extreme care to keep foreign matter out of system. Plug open tubing ends to keep out dust, dirt, and moisture.

Q. Do not attach tubing to equipment that may be removed frequently for maintenance or may impart vibration and expansion from temperature change.

R. Protect exposed tubing in mechanical equipment rooms from inadvertent mechanical damage within 76 inches above floor. Use aluminum channel reversed and secured over tubing to protect tubing from damage.

S. Below-Grade Process Tubing Installation:

1. Install tubing below-grade in a continuous Schedule 80, PVC conduit.
2. Do not exceed 50 percent fill capacity; minimum size 2 inches.
3. Install top of conduit at depth of at least 24 inches below finished grade.
4. Install tubing in raceways dedicated to only process tubing. Do not combine electrical conductors and tubing in raceways.

T. Identify above-grade process tubing as follows:

1. Every 50 ft. of straight run.
2. At least once for each branch within 36 inches of main tee.
3. Near each change in direction.
4. Within 36 inches of each ceiling, floor, roof, and wall penetration.
5. Where exposed to and where concealed from view, including above ceiling plenums, shafts, and chases.
6. Near each isolation valve.
7. Mark each instrument tube connection with a number-coded identification. Each unique tube is to have same unique number at instrument connection and termination at opposite end of tube.

U. Process Tubing Isolation Valves Installation:

1. Install valves full size of piping and tubing.
2. Install isolation valves at the following locations:

    a. Process connection.
    b. Inlet to each instrument including, sensors, transmitters, switches, gauges, and other control devices.

3. Locate valves to be readily accessible from floor.
4. Install needle valves for isolation and throttling applications.

3.21 INSTALLATION OF CONTROL WIRE, CABLE, AND RACEWAY

A. Comply with NECA 1.

B. Wire and Cable Installation:

1. Comply with installation requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
2. Comply with installation requirements in Section 271513 "Communications Copper Horizontal Cabling."

3. Install cables with protective sheathing that is waterproof and capable of withstanding continuous temperatures of 90 deg C with no measurable effect on physical and electrical properties of cable.

    a. Provide shielding to prevent interference and distortion from adjacent cables and equipment.

4. Terminate wiring in a junction box.

    a. Clamp cable over jacket in a junction box.
    b. Individual conductors in the stripped section of cable is to be slack between the clamping point and terminal block.

5. Terminate field wiring and cable not directly connected to instruments and control devices having integral wiring terminals using terminal blocks.
6. Install signal transmission components in accordance with IEEE C2, REA Form 511a, NFPA 70, and as indicated.
7. Use shielded cable to transmitters.
8. Use shielded cable to temperature sensors.
9. Perform continuity and meager testing on wire and cable after installation.

C. Conduit Installation:

1. Comply with Section 260533.13 "Conduits for Electrical systems and Section 260533.16 "Boxes and Covers for Electrical Systems" for control-voltage conductors.

3.22 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and installations, including connections.

B. Testing of Air-Signal Tubing:

1. Test for leaks and obstructions.
2. Disconnect each pipe and tubing line before test is performed, and blowout dust, dirt, trash, condensate, and other foreign materials with compressed air. Use commercially pure compressed air or nitrogen as distributed in gas cylinders. Use of compressed air from oil-free compressor with air dryer is an acceptable alternative for test.
3. After foreign matter is expelled and line is free from obstructions, plug far end of tubing run.
4. Connect pressure source to near end of tubing run with needle valve between air supply and tubing run.
5. Connect pressure gauge accurate to within 0.5 percent of test between shutoff needle valve and tubing run under test.
6. For air signal tubing, apply test pressure of 1.5 times instrument operating pressure range. Record pressure in tubing run every 10 minutes for one hour. Allowable drop in pressure in one-hour period to not exceed 0.1 percent of test pressure.

C. Optical Fiber Cable Testing:

1. Perform preinstallation, in-progress, and final tests, supplemented by additional tests, as necessary.

2. Preinstallation Cable Verification: Verify integrity and serviceability for new cable lengths before installation. This assurance may be provided by using vendor verification documents, testing, or other methods. At a minimum, furnish evidence of verification for cable attenuation and bandwidth parameters.
3. In-Progress Testing: Perform standard tests for correct pair identification and termination during installation to ensure proper installation and cable placement. Perform tests in addition to those specified if there is any reason to question condition of material furnished and installed. Testing accomplished is to be documented by agency conducting tests. Submit test results for Project record.
4. Final Testing: Perform final test of installed system to demonstrate acceptability as installed. Perform testing according to test plan supplied by Direct Digital Control system manufacturer. Correct defective Work or material and retest. At a minimum, final testing for cable system, including spare cable, to verify compliance of attenuation, length, and bandwidth parameters with performance indicated.
5. Test Equipment: Use optical fiber time-domain reflectometer for testing of length and optical connectivity.
6. Test Results: Record test results and submit copy of test results for Project record.

3.23 DIRECT DIGITAL CONTROL SYSTEM I/O CHECKOUT PROCEDURES

A. Check installed products before continuity tests, leak tests, and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.

D. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material, and support.

E. For pneumatic products, verify that air supply for each product is properly installed.

F. Control Damper Checkout:

1. For pneumatic control dampers, verify that pressure gauges are provided in each air line connected to the damper actuator and positioner.
2. Verify that control dampers are installed correctly for flow direction.
3. Verify that proper blade alignment, either parallel or opposed, has been provided.
4. Verify that damper frame attachment is properly secured and sealed.
5. Verify that damper actuator and linkage attachment are secure.
6. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
7. Verify that damper blade travel is unobstructed.

G. Control Valve Checkout:

1. Verify that control valves are installed correctly for flow direction.
2. Verify that valve body attachment is properly secured and sealed.
3. Verify that valve actuator and linkage attachment are secure.
4. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
5. Verify that valve ball, disc, or plug travel is unobstructed.

6. After piping systems have been tested and put into service, but before insulating and balancing, inspect each valve for leaks. Adjust or replace packing to stop leaks. Replace valve if leaks persist.

H. Instrument Checkout:

1. Verify that instrument is correctly installed for location, orientation, direction, and operating clearances.
2. Verify that attachment is properly secured and sealed.
3. Verify that conduit connections are properly secured and sealed.
4. Verify that wiring is properly labeled with unique identification, correct type, and size and is securely attached to proper terminals.
5. Inspect instrument tag against approved submittal.
6. For instruments with tubing connections, verify that tubing attachment is secure and isolation valves have been provided.
7. For flow instruments, verify that recommended upstream and downstream distances have been maintained.
8. For temperature instruments, verify the following:

a. Sensing element type and proper material.
b. Length and insertion.

3.24 DIRECT DIGITAL CONTROL SYSTEM I/O ADJUSTMENT, CALIBRATION, AND TESTING

A. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

B. Provide written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.

C. For each analog instrument, make three-point test of calibration for both linearity and accuracy.

D. Equipment and procedures used for calibration to comply with instrument manufacturer's written instructions.

E. Provide diagnostic and test equipment for calibration and adjustment.

1. Use field testing and diagnostic instruments and equipment with an accuracy at least twice the instrument accuracy of instrument to be calibrated. For example, test and calibrate an installed instrument with accuracy of 1 percent using field testing and diagnostic instrument with accuracy of 0.5 percent or better.

F. Calibrate each instrument in accordance with instruction manual supplied by instrument manufacturer.

G. If after calibration the indicated performance cannot be achieved, replace out-of-tolerance instruments.

H. Comply with field testing requirements and procedures indicated by ASHRAE's Guideline 11, "Field Testing of HVAC Controls Components," in the absence of specific requirements, and to supplement requirements indicated.

I. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

J. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact making or breaking.

K. Control Dampers:

1. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed and back to 100 percent open.
2. Check and document open and close cycle times for applications with cycle time less than 30 seconds.
3. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

L. Control Valves:

1. Stroke and adjust control valves following manufacturer's recommended procedure, from 100 percent open to 100 percent closed and back to 100 percent open.
2. Check and document open and close cycle times for applications with cycle time less than 30 seconds.
3. For control valves equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

M. Meters: Check meters at zero, 50, and 100 percent of Project design values.

N. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

O. Switches: Calibrate switches to make or break contact at set points indicated.

P. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistant source.

3.25 DIRECT DIGITAL CONTROL SYSTEM CONTROLLER CHECKOUT

A. Verify power supply.

1. Verify voltage, phase, and hertz.
2. Verify that protection from power surges is installed and functioning.

3. Verify that ground fault protection is installed.
4. If applicable, verify if connected to UPS unit.
5. If applicable, verify if connected to backup power source.
6. If applicable, verify that power conditioning units are installed.

B. Verify that wire and cabling are properly secured to terminals and labeled with unique identification.

C. Verify that spare I/O capacity is provided.

3.26 DIRECT DIGITAL CONTROL CONTROLLER I/O CONTROL LOOP TESTS

A. Testing:

1. Test every I/O point connected to Direct Digital Control controller to verify that safety and operating control set points are as indicated and as required to operate controlled system safely and at optimum performance.
2. Test every I/O point throughout its full operating range.
3. Test every control loop to verify that operation is stable and accurate.
4. Adjust control loop proportional, integral, and derivative settings to achieve optimum performance while complying with performance requirements indicated. Document testing of each control loop's precision and stability via trend logs.
5. Test and adjust every control loop for proper operation according to sequence of operation.
6. Test software and hardware interlocks for proper operation. Correct deficiencies.
7. Operate each analog point at the following:

    a. Upper quarter of range.
    b. Lower quarter of range.
    c. At midpoint of range.

8. Exercise each binary point.
9. For every I/O point in Direct Digital Control system, read and record each value at operator workstation, at Direct Digital Control controller, and at field instrument simultaneously. Value displayed at operator workstation, at Direct Digital Control controller, and at field instrument must match.
10. Prepare and submit report documenting results for each I/O point in Direct Digital Control system and include in each I/O point a description of corrective measures and adjustments made to achieve desire results.

3.27 DIRECT DIGITAL CONTROL SYSTEM VALIDATION TESTS

A. Perform validation tests before requesting final review of system. Before beginning testing, first submit Pretest Checklist and Test Plan.

B. After approval of Pretest Checklist and Test Plan, execute all tests and procedures indicated in plan.

C. After testing is complete, submit completed Pretest Checklist.

D. Pretest Checklist: Submit the following list with items checked off once verified:

1. Detailed explanation for any items that are not completed or verified.
2. Required mechanical installation work is successfully completed and HVAC equipment is working correctly.
3. HVAC equipment motors operate below full-load amperage ratings.
4. Required Direct Digital Control system components, wiring, and accessories are installed.
5. Installed Direct Digital Control system architecture matches approved Drawings.
6. Control electric power circuits operate at proper voltage and are free from faults.
7. Required surge protection is installed.
8. Direct Digital Control system network communications function properly, including uploading and downloading programming changes.
9. Using BACnet protocol analyzer, verify that communications are error free.
10. Each controller's programming is backed up.
11. Equipment, products, tubing, wiring cable, and conduits are properly labeled.
12. All I/O points are programmed into controllers.
13. Testing, adjusting, and balancing work affecting controls is complete.
14. Dampers and actuators zero and span adjustments are set properly.
15. Each control damper and actuator goes to failed position on loss of power and loss of signal.
16. Valves and actuators zero and span adjustments are set properly.
17. Each control valve and actuator goes to failed position on loss of power and loss of signal.
18. Meter, sensor, and transmitter readings are accurate and calibrated.
19. Control loops are tuned for smooth and stable operation.
20. View trend data where applicable.
21. Each controller works properly in standalone mode.
22. Safety controls and devices function properly.
23. Interfaces with fire-alarm system function properly.
24. Electrical interlocks function properly.
25. Operator workstations and other interfaces are delivered, all system and database software is installed, and graphics are created.
26. Record Drawings are completed.

E. Test Plan:

1. Prepare and submit validation Test Plan including test procedures for performance validation tests.
2. Address all specified functions of Direct Digital Control system and sequences of operation in Test Plan.
3. Explain detailed actions and expected results to demonstrate compliance with requirements indicated.
4. Explain method for simulating necessary conditions of operation used to demonstrate performance.
5. Include Test Checklist to be used to check and initial that each test has been successfully completed.
6. Submit Test Plan documentation 10 business days before start of tests.

F. Validation Test:

1. Verify operating performance of each I/O point in Direct Digital Control system.

    a. Verify analog I/O points at operating value.
    b. Make adjustments to out-of-tolerance I/O points.

        1) Identify I/O points for future reference.

2) Simulate abnormal conditions to demonstrate proper function of safety devices.
3) Replace instruments and controllers that cannot maintain performance indicated after adjustments.

2. Simulate conditions to demonstrate proper sequence of control.
3. Readjust settings to design values and observe ability of Direct Digital Control system to establish desired conditions.
4. 24 hours after initial validation test, do as follows:

   a. Re-check I/O points that required corrections during initial test.
   b. Identify I/O points that still require additional correction and make corrections necessary to achieve desired results.

5. 24 Hours after second validation test, do as follows:

   a. Re-check I/O points that required corrections during second test.
   b. Continue validation testing until I/O point is normal on two consecutive tests.

6. Completely check out, calibrate, and test all connected hardware and software to ensure that Direct Digital Control system performs according to requirements indicated.
7. After validation testing is complete, prepare and submit report indicating results of testing. For all I/O points that required correction, indicate how many validation re-tests it took to pass. Identify adjustments made for each test and indicate instruments that were replaced.

G. Direct Digital Control System Response Time Test:

1. Simulate HLC.

   a. Heavy load to be occurrence of 50 percent of total connected binary COV, one-half of which represents "alarm" condition, and 50 percent of total connected analog COV, one-half of which represents "alarm" condition, that are initiated simultaneously on a one-time basis.

2. Initiate 10 successive occurrences of HLC and measure response time to typical alarms and status changes.
3. Measure with timer having at least 0.1-second resolution and 0.01 percent accuracy.
4. Purpose of test is to demonstrate Direct Digital Control system, as follows:

   a. Reaction to COV and alarm conditions during HLC.
   b. Ability to update Direct Digital Control system database during HLC.

5. Passing test is contingent on the following:

   a. Alarm reporting at printer beginning no more than two seconds after initiation (time zero) of HLC.
   b. All alarms, both binary and analog, are reported and printed; none are lost.
   c. Compliance with response times specified.

6. Prepare and submit report documenting HLC tested and results of test including time stamp and print out of all alarms.

H. Direct Digital Control System Network Bandwidth Test:

1. Test network bandwidth usage on all Direct Digital Control system networks to demonstrate bandwidth usage under Direct Digital Control system normal operating conditions and under simulated HLC.
2. To pass, none of Direct Digital Control system networks are to use more than 70 percent of available bandwidth under normal and HLC operation.

3.28 VERIFICATION OF Direct Digital Control SYSTEM WIRELESS NETWORK

A. Direct Digital Control system Installer is to design wireless Direct Digital Control system networks to comply with performance requirements indicated.

B. Verify wireless network performance through field testing and document results in a field test report.

C. Testing and verification of all wireless devices to include, but not be limited to, the following:

1. Speed.
2. Online status.
3. Signal strength.

3.29 FINAL REVIEW

A. Submit written request to Commissioner and Commissioning Agent when Direct Digital Control system is ready for final review. State the following:

1. Direct Digital Control system has been thoroughly inspected for compliance with Contract Documents and found to be in full compliance.
2. Direct Digital Control system has been calibrated, adjusted, and tested and found to comply with requirements of operational stability, accuracy, speed, and other performance requirements indicated.
3. Direct Digital Control system monitoring and control of HVAC systems results in operation according to sequences of operation indicated.
4. Direct Digital Control system is complete and ready for final review.

B. Upon receipt of written request for final review, Commissioner and Commissioning Agent to start review within 10 business days and upon completion issue field report(s) documenting observations and deficiencies.

C. Take prompt action to remedy deficiencies indicated in reviewer's field report(s) and submit second written request after all deficiencies have been corrected. Repeat process until no deficiencies are reported.

D. Prepare and submit closeout submittals when no deficiencies are reported.

E. Part of Direct Digital Control system final review must include demonstration to parties participating in final review.

1. Provide staff familiar with Direct Digital Control system installed to demonstrate operation of Direct Digital Control system during final review.

2. Provide testing equipment to demonstrate accuracy and other performance requirements of Direct Digital Control system that is requested by reviewers during final review.
3. Demonstration to include, but not be limited to, the following:

    a. Accuracy and calibration of 10 I/O points randomly selected by reviewers. If review finds that some I/O points are not properly calibrated and not satisfying performance requirements indicated, additional I/O points may be selected by reviewers until total I/O points being reviewed that satisfy requirements equals quantity indicated.
    b. HVAC equipment and system hardwired and software safeties and life-safety functions are operating according to sequence of operation. Up to 10 I/O points to be randomly selected by reviewers. Additional I/O points may be selected by reviewers to discover problems with operation.
    c. Correct sequence of operation after electrical power interruption and resumption after electrical power is restored for randomly selected HVAC systems.
    d. Operation of randomly selected dampers and valves in normal-on, normal-off, and failed positions.
    e. Reporting of alarm conditions for randomly selected alarms, including different classes of alarms, to ensure that alarms are properly received by operators and operator workstations.
    f. Trends, summaries, logs, and reports set up for Project.
    g. For up to three HVAC systems randomly selected by reviewers, use graph trends to show that sequence of operation is executed in correct manner and that HVAC systems operate properly through complete sequence of operation including different modes of operations indicated. Show that control loops are stable and operating at set points and respond to changes in set point of 20 percent or more.
    h. Software's ability to communicate with controllers, operator workstations, and uploading and downloading of control programs.
    i. Software's ability to edit control programs offline.
    j. Data entry to show Project-specific customizing capability including parameter changes.
    k. Step through penetration tree, display all graphics, demonstrate dynamic update, and direct access to graphics.
    l. Execution of digital and analog commands in graphic mode.
    m. Spreadsheet and curve plot software and its integration with database.
    n. Online user guide and help functions.
    o. Multitasking by showing different operations occurring simultaneously on four quadrants of split screen.
    p. System speed of response compared to requirements indicated.
    q. For Each Network Controller:

        1) Memory: Programmed data, parameters, trend, and alarm history collected during normal operation are not to be lost during power failure.
        2) Operator Interface: Ability to connect directly to each type of digital controller with portable workstation and mobile device. Show that maintenance personnel interface tools perform as indicated in manufacturer's technical literature.
        3) Standalone Ability: Demonstrate that controllers provide stable and reliable standalone operation using default values or other method for values normally read over network.
        4) Electric Power: Ability to disconnect any controller safely from its power source.
        5) Wiring Labels: Match control drawings.
        6) Network Communication: Ability to locate controller's location on network and communication architecture matches Shop Drawings.

7) Nameplates and Tags: Accurate and permanently attached to control panel doors, instrument, actuators, and devices.

r. For Each Operator Workstation:

1) I/O points lists agree with naming conventions.
2) Graphics are complete.
3) UPS unit, if applicable, operates.

s. Communications and Interoperability: Demonstrate proper interoperability of data sharing, alarm and event management, trending, scheduling, and device and network management. Use ASHRAE 135 protocol analyzer to help identify devices, view network traffic, and verify interoperability. Requirements must be met even if only one manufacturer's equipment is installed.

1) Data Presentation: On each operator workstation, demonstrate graphic display capabilities.
2) Reading of Any Property: Demonstrate ability to read and display any used readable object property of any device on network.
3) Set-Point and Parameter Modifications: Show ability to modify set points and tuning parameters indicated.
4) Peer-to-Peer Data Exchange: Network devices are installed and configured to perform without need for operator intervention to implement Project sequence of operation and to share global data.
5) Alarm and Event Management: Alarms and events are installed and prioritized according to City of New York. Demonstrate that time delays and other logic are set up to avoid nuisance tripping. Show that operators with sufficient privileges are permitted.
6) Schedule Lists: Schedules are configured for start and stop, mode change, occupant overrides, and night setback as defined in sequence of operations.
7) Schedule Display and Modification: Ability to display any schedule with start and stop times for calendar year. Show that all calendar entries and schedules are modifiable from any connected operator workstation by an operator with sufficient privilege.
8) Archival Storage of Data: Data archiving is handled by operator workstation and server and local trend archiving and display is accomplished.
9) Modification of Trend Log Object Parameters: Operator with sufficient privilege can change logged data points, sampling rate, and trend duration.
10) Device and Network Management:

a) Display of network device status.
b) Display of BACnet object information.
c) Silencing devices transmitting erroneous data.
d) Time synchronization.
e) Remote device re-initialization.
f) Backup and restore network device programming and master database(s).
g) Configuration management of routers.

3.30 EXTENDED OPERATION TEST

A. Operate Direct Digital Control system for operating period of 14 consecutive calendar days following Substantial Completion. Coordinate exact start date of testing with Commissioner.

B. Provide operator familiar with Direct Digital Control system installed to man an operator workstation during eight hours of each normal business day occurring during operating period.

C. During operating period, Direct Digital Control system to demonstrate correct operation and accuracy of monitored and controlled points as well as operation capabilities of sequences, logs, trends, reports, specialized control algorithms, diagnostics, and other software indicated.

1. Correct defects of hardware and software when they occur.

D. Definition of Failures and Downtime during Operating Period:

1. Failed I/O point constituting downtime is I/O point failing to perform its intended function consistently and a point physically failed due to hardware and software.
2. Downtime is when any I/O point in Direct Digital Control system is unable to fulfill its required function.
3. Calculate downtime as elapsed time between detected point failure as confirmed by operator, and time point is restored to service.
4. Maximum time interval allowed between Direct Digital Control system detection of failure occurrence and operator confirmation is to be 0.5 hours.
5. Log downtime in hours to nearest 0.1 hour.
6. Power outages do not count as downtime, but do suspend test hours unless systems are provided with UPS and served through a backup power source.
7. Hardware or software failures caused by power outages do count as downtime.

E. During operating period, log downtime and operational problems are encountered.

1. Identify source of problem.
2. Provide written description of corrective action taken.
3. Record duration of downtime.
4. Maintain log showing the following:

a. Time of occurrence.
b. Description of each occurrence and pertinent written comments for reviewer to understand scope and extent of occurrence.
c. Downtime for each failed I/O point.
d. Running total of downtime and total time of I/O point after each problem has been restored.

5. Make log available to Commissioner for review at any time.

F. For Direct Digital Control system to pass extended operation test, total downtime is limited to 2 percent of total point-hours during operating period.

1. If Direct Digital Control system testing results fail to comply with minimum requirements of passing at end of operating period indicated, extend operating period one consecutive day at a time until Direct Digital Control system passes requirement.

G. Base evaluation of Direct Digital Control system passing test on the following calculation:

1. Count downtime on point-hour basis where total number of Direct Digital Control system point-hours is equal to total number of I/O points in Direct Digital Control system multiplied by total number of hours during operating period.
2. One point-hour of downtime is one I/O point down for one hour. For example, three I/O points down for five hours is total of 15 point-hours of downtime. Four points down for one-half hour is two point-hours of downtime.
3. Example Calculation: Maximum allowable downtime for 30-day test for Direct Digital Control system with 1000 total I/O points (combined analog and binary) and passing score of 1 percent downtime is computed by 30 days x 24 h/day x 1000 points x 1 percent equals 7200 point-hours of maximum allowable downtime.

H. Prepare test and inspection reports.

3.31 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.32 DEMONSTRATION

A. Engage a factory-authorized service representative with complete knowledge of Project-specific system installed to instruct City of New York's personnel to adjust and operate Direct Digital Control system.

1. Base extent of instruction on scope and complexity of Direct Digital Control system indicated.
2. Submit outline of instruction for Commissioner's review at least 10 business day before scheduling instruction.
3. Coordinate with Commissioner location of instruction and schedule instruction a minimum of 20 business days before expected Substantial Completion.
4. Provide each attendee with hard copies, and flash-drive with PDF copy of all materials and visual presentations.
5. Provide City of New York digital video and audio recordings of instruction.

END OF SECTION 230923

SECTION 230923.11 - CONTROL VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes control valves and actuators for Direct Digital Control systems.

B. Related Requirements:

1. Section 230923 "Direct Digital Control (DDC) System for HVAC" control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Controls" for requirements that relate to Section 230923.11.

1.3 DEFINITIONS

A. Cv: Design valve coefficient.

B. NBR: Nitrile butadiene rubber.

C. PTFE: Polytetrafluoroethylene

D. RMS: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.

2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
3. Product description with complete technical data, performance curves, and product specification sheets.
4. Installation, operation, and maintenance instructions, including factors affecting performance.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Include diagrams for pneumatic signal and main air tubing.

C. Coordination Drawings: Plan drawings and corresponding product installation details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Control valve installation location shown in relationship to room, duct, pipe, and equipment.
2. Size and location of wall access panels for control valves installed behind walls.
3. Size and location of ceiling access panels for control valves installed above inaccessible ceilings.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For control valves to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASME Compliance: Fabricate and label products to comply with ASME Boiler and Pressure Vessel Code where required by 2014 NYC Building Codes.

C. Engineering Services: Engage a qualified professional engineer licensed in the State of New York as defined in DDC General Conditions, to size products where indicated.

D. Ground Fault: Products must not fail due to ground fault condition when suitably grounded.

E. Backup Power Source: Systems and equipment served by a backup power source must have associated control valve actuators served from a backup power source.

F. Environmental Conditions:

1. Provide electric control valve actuators, with protective enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. Electric control valve actuators not available with integral enclosures, complying with requirements indicated, must be housed in protective secondary enclosures.

    a. Hazardous Locations: Explosion-proof rating for condition.

G. Determine control valve sizes and flow coefficients by ISA 75.01.01.

H. Control valve characteristics and rangeability must comply with ISA 75.11.01.

I. Selection Criteria:

1. Control valves must be suitable for operation at following conditions:

    a. Automatic control valves must be single-seated globe valves and must have equal percentage flow characteristics unless specified otherwise. Control valves 2 inches and smaller must have bronze bodies and stainless steel trim and stem. End connections must be threaded. Control valves 2-1/2 in. and larger in a service where pressure does not exceed 125 psig at 350°F, or where steam pressure does not exceed 100 psig, must have 125 pound cast iron bodies. Trim and stem must be stainless steel. End connections must be flanged. Valves 2-1/2 in. and larger in a service where pressure does not exceed 250 psig at 400°F must have 250 pound cast iron bodies. Trim and stem must be stainless steel. End connections must be flanged. Valves must have sufficient stuffing box protection to ensure against leakage at hydrostatic head involved.
    b. Valve must be suitable for chilled and hot water service. Flow characteristic must be equal percentage. Body must be forged brass. Ball and stem must be chrome-plated brass. Seat must be fiberglass-reinforced Teflon PTFE. Valve must be provided with characterized disk. Pressure rating must be 600 psi for 1 in. valve and below, 400 psi for all others. Media temperature range must be 0°F to 250°F. Leakage must be ANSI Class IV. Valve actuator must be spring-return type with 24 VAC power supply, 2 -10 VDC control signal and manual override.

2. Control valve shutoff classifications must be FCI 70-2, Class IV or better unless otherwise indicated.
3. Valve pattern, three-way or straight through, must be as indicated on Drawings.
4. Modulating straight-through pattern control valves must have equal percentage flow-throttling characteristics unless otherwise indicated.
5. Modulating three-way pattern water valves must have linear flow-throttling characteristics. The total flow through the valve must remain constant regardless of the valve's position.
6. Modulating butterfly valves must have linear flow-throttling characteristics.
7. Fail positions unless otherwise indicated:

    a. Condenser Water: Close.
    b. Heat Recovery: Close.
    c. Heating Hot Water: Open.

8. Globe-type control valves must pass the design flow required with not more than 95 percent of stem lift unless otherwise indicated.
9. Rotary-type control valves, such as ball and butterfly valves, must have Cv falling between 65 and 75 degrees of valve full open position and minimum valve Cv between 15 and 25 percent of open position.
10. Selection must consider viscosity, flashing, and cavitation corrections.
11. Valves must have stable operation throughout full range of operation, from design to minimum Cv.
12. Minimum Cv must be calculated at 10 percent of design flow, with a coincident pressure differential equal to the system design pump head.
13. In water systems, select modulating control valves at terminal equipment for a design Cv based on a pressure drop of 5 psig at design flow unless otherwise indicated.
14. Modulating valve sizes for steam service must provide a pressure drop at design flow equal to lesser of the following:

    a. 50 percent of the valve inlet pressure.
    b. 50 percent of the absolute steam pressure at the valve inlet.

15. Two-position control valves must be line size unless otherwise indicated.
16. In water systems, use ball- or globe-style control valves for two-position control for valves NPS 2 and smaller and butterfly style for valves larger than NPS 2.
17. In steam systems, use ball- or globe-style control valves regardless of size.

2.2 BALL-STYLE CONTROL VALVES

A. Ball Valves with Single Port and Characterized Disk:

1. Pressure Rating for NPS 1 and Smaller: Nominal 600 WOG.
2. Pressure Rating for NPS 1-1/2 through NPS 2: Nominal 400 WOG.
3. Close-off Pressure: 200 psig.
4. Process Temperature Range: Zero to 212 deg F.
5. Body and Tail Piece: Cast bronze ASTM B 61, ASTM B 62, ASTM B 584, or forged brass with nickel plating.
6. End Connections: Threaded (NPT) ends.
7. Ball: Chrome-plated brass or bronze or 300 series stainless steel.
8. Stem and Stem Extension:

    a. Material to match ball.
    b. Blowout-proof design.
    c. Sleeve or other approved means to allow valve to be opened and closed without damaging the insulation or the vapor barrier seal.

9. Ball Seats: Reinforced PTFE.
10. Stem Seal: Reinforced PTFE packing ring with a threaded packing ring follower to retain the packing ring under design pressure with the linkage removed. Alternative means, such as EPDM O-rings, are acceptable if an equivalent cycle endurance can be demonstrated by testing.
11. Flow Characteristic: Equal percentage.

2.3 BUTTERFLY-STYLE CONTROL VALVES

A. Commercial-Grade, Two-Way Butterfly Valves:

1. Performance:

   a. Bi-directional bubble tight shutoff at 250 psig.
   b. Comply with MSS SP-67 or MSS SP-68.
   c. Rotation: Zero to 90 degrees.
   d. Linear or modified equal percentage flow characteristic.

2. Body: Cast iron ASTM A 126, Class B, ductile iron ASTM A 536 or cast steel ASTM A 216/A 216M WCB fully lugged, suitable for mating to ASME B16.5 flanges.
3. Disc: 316 stainless steel.
4. Shaft: 316 or 17-4 PH stainless steel.
5. Seat: Reinforced EPDM or reinforced PTFE with retaining ring.
6. Shaft Bushings: Reinforced PTFE or stainless steel.
7. Replaceable seat, disc, and shaft bushings.
8. Corrosion-resistant nameplate indicating:

   a. Manufacturer's name, model number, and serial number.
   b. Body size.
   c. Body and trim materials.
   d. Flow arrow.

2.4 GLOBE-STYLE CONTROL VALVES

A. General Globe-Style Valve Requirements:

1. Globe-style control valve body dimensions must comply with ISA 75.08.01.
2. Construct the valves to be serviceable from the top.
3. For cage guided valves, trim must be field interchangeable for different valve flow characteristics, such as equal percentage, linear, and quick opening.
4. Reduced trim for one nominal size smaller must be available for industrial valves NPS 1 and larger.
5. Replaceable seats and plugs.
6. Furnish each control valve with a corrosion-resistant nameplate indicating the following:

   a. Manufacturer's name, model number, and serial number.
   b. Body and trim size.
   c. Arrow indicating direction of flow.

B. Two-Way Globe Valves NPS 2 and Smaller:

1. Globe Style: Single port.
2. Body: Cast bronze or forged brass with ASME B16.5, Class 250 rating.
3. End Connections: Threaded.
4. Bonnet: Screwed.

5. Packing: PTFE V-ring.
6. Plug: Top guided.
7. Plug, Seat, and Stem: Brass or stainless steel.
8. Process Temperature Range: 35 to 248 deg F.
9. Ambient Operating Temperature: 35 to 150 deg F.
10. Leakage: FCI 70-2, Class IV.
11. Rangeability: 25 to 1.
12. Equal percentage flow characteristic.

C. Two-Way Globe Valves NPS 2-1/2 to NPS 6:

1. Globe Style: Single port.
2. Body: Cast iron complying with ASME B61.1, Class 125.
3. End Connections: Flanged, suitable for mating to ASME B16.5, Class 150 flanges.
4. Bonnet: Bolted.
5. Packing: PTFE cone-ring.
6. Plug: Top or bottom guided.
7. Plug, Seat, and Stem: Brass or stainless steel.
8. Process Temperature Rating: 35 to 281 deg F.
9. Leakage: 0.1 percent of maximum flow.
10. Rangeability: Varies with valve size between 6 and 10 to 1.
11. Modified linear flow characteristic.

2.5 ELECTRIC AND ELECTRONIC CONTROL VALVE ACTUATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belimo Aircontrols (USA), Inc.
2. Honeywell Water Controls.
3. Johnson Controls.
4. Siemens Building Technologies, Inc.
5. Or approved equal.

B. Actuators for Hydronic Control Valves: Capable of closing valve against system pump shutoff head plus 10%.

C. Position indicator and graduated scale on each actuator.

D. Type: Motor operated, with or without gears, electric and electronic.

E. Voltage: 120-V ac.

F. Deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage.

G. Function properly within a range of 85 to 120 percent of nameplate voltage.

H. Construction:

1. For Actuators Less Than 100 W: Fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings, and pressed steel enclosures.
2. For Actuators from 100 to 400 W: Gears ground steel, oil immersed, shaft hardened steel running in bronze, copper alloy or ball bearings. Operator and gear trains must be totally enclosed in dustproof cast-iron, cast-steel or cast-aluminum housing.
3. For Actuators Larger Than 400 W: Totally enclosed reversible induction motors with auxiliary hand crank and permanently lubricated bearings.

I. Field Adjustment:

1. Spring Return Actuators: Easily switchable from fail open to fail closed in the field without replacement.
2. Gear Type Actuators: External manual adjustment mechanism to allow manual positioning when the actuator is not powered.

J. Two-Position Actuators: Single direction, spring return or reversing type.

K. Modulating Actuators:

1. Operation: Capable of stopping at all points across full range, and starting in either direction from any point in range.
2. Control Input Signal:

    a. Three Point, Tristate, or Floating Point: Clockwise and counter-clockwise inputs. One input drives actuator to open position and other input drives actuator to close position. No signal of either input remains in last position.
    b. Proportional: Actuator drives proportional to input signal and modulates throughout its angle of rotation. Suitable for zero- to 10- or 2- to 10-V dc and 4- to 20-mA signals.
    c. Pulse Width Modulation (PWM): Actuator drives to a specified position according to pulse duration (length) of signal from a dry contact closure, triac sink, or source controller.
    d. Programmable Multi-Function:

        1) Control Input, Position Feedback, and Running Time: Factory or field programmable.
        2) Diagnostic: Feedback of hunting or oscillation, mechanical overload, mechanical travel, and mechanical load limit.
        3) Service Data: Include, at a minimum, number of hours powered and number of hours in motion.

L. Position Feedback:

1. Equip two-position actuators with limits switches or other positive means of a position indication signal for remote monitoring of open and close position.
2. Equip modulating actuators with a position feedback through current or voltage signal for remote monitoring.
3. Provide a position indicator and graduated scale on each actuator indicating open and closed travel limits.

M. Fail-Safe:

1. Where indicated, provide actuator to fail to an end position.
2. Internal spring return mechanism to drive controlled device to an end position (open or close) on loss of power.
3. Batteries, capacitors, and other non-mechanical forms of fail-safe operation are acceptable only where uniquely indicated.

N. Integral Overload Protection:

1. Provide against overload throughout the entire operating range in both directions.
2. Electronic overload, digital rotation sensing circuitry, mechanical end switches, or magnetic clutches are acceptable methods of protection.

O. Valve Attachment:

1. Unless otherwise required for valve interface, provide an actuator designed to be directly coupled to valve shaft without the need for connecting linkages.
2. Attach actuator to valve drive shaft in a way that ensures maximum transfer of power and torque without slippage.
3. Bolt and set screw method of attachment is acceptable only if provided with at least two points of attachment.

P. Temperature and Humidity:

1. Temperature: Suitable for operating temperature range encountered by application with minimum operating temperature range of minus 20 to plus 120 deg F.
2. Humidity: Suitable for humidity range encountered by application; minimum operating range must be from 5 to 95 percent relative humidity, non-condensing.

Q. Enclosure:

1. Suitable for ambient conditions encountered by application.
2. NEMA 250, Type 2 for indoor and protected applications.
3. NEMA 250, Type 4 or Type 4X for outdoor and unprotected applications.
4. Provide actuator enclosure with heater and control where required by application.

R. Stroke Time:

1. Operate valve from fully closed to fully open within 150 seconds.
2. Operate valve from fully open to fully closed within 150 seconds.
3. Move valve to failed position within 30 seconds.
4. Select operating speed to be compatible with equipment and system operation.

S. Sound:

1. Spring Return: 62 dBA.
2. Non-Spring Return: 45 dBA.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for valves installed in piping to verify actual locations of piping connections before installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 CONTROL VALVE APPLICATIONS

A. Control Valves:

1. Select from valves specified in "Control Valves" Article to achieve performance requirements and characteristics indicated while subjected to full range of system operation encountered.
2. Hot water System, , Two-Way Applications Controlled by Flow: Ball valves with single port and characterized disk Globe-style, two-way valves.

3.4 INSTALLATION, GENERAL

A. Furnish and install products required to satisfy most stringent requirements indicated.

B. Install products level, plumb, parallel, and perpendicular with building construction.

C. Properly support instruments, tubing, piping, wiring, and conduits to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment .

D. Provide ceiling, floor, roof, and wall openings and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

E. Firestop penetrations made in fire-rated assemblies and seal penetrations made in acoustically rated assemblies.

F. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that will cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

G. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for City of New York's access, confirm unrestricted ladder placement is possible under occupied condition.

3.5 ELECTRIC POWER

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers. Comply with requirements in another section of these specifications.

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements for raceways and boxes specified in Section 260533.13 "Conduits for Electrical Systems." Comply with requirements for boxes specified in Section 260533.16 "Boxes and Covers for Electrical Systems."

3.6 CONTROL VALVES

A. Install pipe reducers for valves smaller than line size. Position reducers as close to valve as possible but at distance to avoid interference and impact to performance. Install with manufacturer-recommended clearance.

B. Install flanges or unions to allow drop-in and -out valve installation.

C. Valve Orientation:

1. Where possible, install globe and ball valves installed in horizontal piping with stems upright and not more than 15 degrees off of vertical, not inverted.
2. Install valves in a position to allow full stem movement.
3. Where possible, install butterfly valves that are installed in horizontal piping with stems in horizontal position and with low point of disc opening with direction of flow.

D. Clearance:

1. Locate valves for easy access and provide separate support of valves that cannot be handled by service personnel without hoisting mechanism.
2. Install valves with at least 12 inches of clear space around valve and between valves and adjacent surfaces.

E. Threaded Valves:

1. Note internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.
2. Align threads at point of assembly.
3. Apply thread compound to external pipe threads, except where dry seal threading is specified.
4. Assemble joint, wrench tight. Apply wrench on valve end as pipe is being threaded.

F. Flanged Valves:

1. Align flange surfaces parallel.
2. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

3.7 CONNECTIONS

A. Connect electrical devices and components to electrical grounding system. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.8 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing must have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with valve identification on valve and on face of ceiling directly below valves concealed above ceilings.

3.9 CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed interior and exterior surfaces.

B. Wash and shine glazing.

C. Polish glossy surfaces to a clean shine.

3.10 CHECKOUT PROCEDURES

A. Control Valve Checkout:

1. Check installed products before continuity tests, leak tests, and calibration.
2. Check valves for proper location and accessibility.
3. Check valves for proper installation for direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.
4. For pneumatic products, verify air supply for each product is properly installed.

5. Verify that control valves are installed correctly for flow direction.
6. Verify that valve body attachment is properly secured and sealed.
7. Verify that valve actuator and linkage attachment are secure.
8. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
9. Verify that valve ball, disc, and plug travel are unobstructed.
10. After piping systems have been tested and put into service, but before insulating and balancing, inspect each valve for leaks. Adjust or replace packing to stop leaks. Replace the valve if leaks persist.

3.11 ADJUSTMENT, CALIBRATION, AND TESTING

A. Stroke and adjust control valves following manufacturer's recommended procedure, from 100 percent open to 100 percent closed back to 100 percent open.

B. Stroke control valves with pilot positioners. Adjust valve and positioner following manufacturer's recommended procedure, so valve is 100 percent closed, 50 percent closed, and 100 percent open at proper air pressures.

C. Check and document open and close cycle times for applications with a cycle time of less than 30 seconds.

D. For control valves equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

END OF SECTION 230923.11

SECTION 230923.12 - CONTROL DAMPERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Rectangular control dampers with airfoil blades.
2. Rectangular control dampers with insulated blades.
3. Round control dampers.
4. Electric and electronic control-damper actuators.

B. Related Requirements:

1. Section 230923 "Direct Digital Control (DDC) System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC DDC" for requirements that relate to this Section.

1.3 DEFINITIONS

A. RMS: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.

B. Thermal Efficiency Ratio (E): Comparison of a tested damper's thermal performance against a v-groove blade reference damper. A damper with the same thermal efficiency as the reference damper would have an E value of 0 percent, while a damper that is 4 times as efficient would have an E value of 200 percent.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of damper and actuator:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.

2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
3. Product description with complete technical data, performance curves, and product specification sheets.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Coordination Drawings: Plan drawings and corresponding product installation details, drawn to scale, on which the following items are indicated and coordinated with each other, using input from installers of the items involved:

1. Product installation location indicated in relationship to room, duct, and equipment.
2. Size and location of wall access panels for control dampers and actuators installed behind walls.
3. Size and location of ceiling access panels for control dampers and actuators installed above inaccessible ceilings.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For control dampers.

1.7 QUALITY ASSURANCE

A. Refer to DDC Geneal Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE 62.1 Compliance: Applicable outdoor ventilation requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

D. Code Compliance: Comply with 2020 NYC Energy Conservation Code.

E. Ground Fault: Properly ground products to prevent failing due to ground fault conditions.

F. Backup Power Source: Serve control-damper actuators from a backup power source where associated with systems and equipment served by a backup power source.

G. Environmental Conditions: For actuators not available with integral enclosures complying with requirements indicated, house in protective secondary enclosures complying with requirements.

H. Selection Criteria:

1. Multi-Blade Damper Configuration: See Drawings:

   a. Two-Position Control: Opposed.
   b. Equipment Isolation Applications: parallel.
   c. Face and Bypass Applications: Opposed.
   d. Outdoor/Return Air-Mixing Applications: Opposed.
   e. All Other Applications: Opposed.

2. Fail-Safe Positions: As follows unless otherwise indicated on Drawings:

   a. Supply Air: Close.
   b. Return Air: Close.
   c. Outdoor Air: Close.
   d. Mixed Air: Open.
   e. Exhaust Air: Close.

3. Select dampers with smooth and stable operation throughout full range of operation over varying pressures and temperatures encountered.
4. Sizing: As follows unless otherwise indicated on Drawings

   a. Modulating Dampers: Select damper size for a pressure drop of between 20 and 50 percent of fan total static pressure unless otherwise indicated.
   b. Two-Position Dampers: Full size of duct or equipment connection unless otherwise indicated.

2.2 RECTANGULAR CONTROL DAMPERS WITH AIRFOIL BLADES

A. General Requirements:

1. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.

   a. Include multisection damper assemblies with intermediate reinforcing where required between individual sections being joined together. Construct reinforcing of same material (aluminum, galvanized steel, stainless steel) as damper frame.

2. Factory install actuator(s) as integral part of damper assembly. Coordinate, with damper manufacturer, field requirements for actuators, such as type, fail-safe position, power supply, location, and mounting requirements.

B. Rectangular Control Dampers with Aluminum Airfoil Blades and Frames:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Greenheck Fan Corporation.
    b. Johnson Controls, Inc.
    c. Ruskin Company.
    d. TAMCO (T. A. Morrison & Co. Inc.).
    e. Or approved equal.

2. Source Limitations: Obtain rectangular control dampers, with aluminum airfoil blades and frames, from single manufacturer.
3. AMCA Certification: Test, rate, and seal, in accordance with AMCA 511 for air performance and air leakage.
4. Performance:

    a. Leakage:

        1) AMCA 511, Class 1A, at 1 in. wg differential static pressure: Leakage not to exceed 3 cfm/sq. ft. against 1 in. wg differential static pressure when tested in accordance with AMCA 500D.
        2) AMCA 511, Class 1, at 4 in. wg differential static pressure: Leakage not to exceed 8 cfm/sq. ft. against 4 in. wg differential static pressure when tested in accordance with AMCA 500D.

    b. Pressure Drop: 0.05 in. wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500D, figure 5.3.
    c. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/180 of blade length.
    d. Temperature: Minus 40 to plus 250 deg F.
    e. Velocity: Up to 4000 fpm.

5. Construction:

    a. Frame:

        1) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, minimum 0.125 inch thick.
        2) Arrangement: Hat-shaped channel with integral extended face flange(s) having mating face of minimum 1 inch for attachment to duct flanges, plenum walls, and equipment.
        3) Width: Not less than 5 inches.

    b. Blades:

        1) Configuration: Parallel or opposed blade configuration as required by application.
        2) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, 0.07 inch thick.
        3) Shape: Hollow, airfoil.
        4) Length: As required by close-off pressure rating, not to exceed 48 inches.
        5) Width: Not to exceed 6 inches.

c. Seals:

1) Blades: Replaceable; extruded Santoprene, silicone, or damper manufacturer-offered equivalent, as required by performance requirements. Seals are mechanically attached in extruded blade slots.
2) Jambs: Replaceable; stainless steel, compression type or mechanically attached extruded silicone.

d. Axles:

1) Diameter: Minimum 0.5 inch.
2) Material: Aluminum,.
3) Mechanically attached to blades.

e. Bearings:

1) Material: Molded acetal stainless steel sleeve, as required by operating conditions, mounted in frame.
2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Plated steel.
2) Material: Aluminum,.
3) Mounting: Concealed in frame.

g. Transitions with Sleeve:

1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connections.
2) Factory mount damper in a sleeve with a close transition to mate to field connection.

a) Sleeve length not less than 12 inches for dampers without jackshafts and not less than 16 inches for dampers with jackshafts.
b) Oversize damper and sleeve for duct connection size plus minimum 4 inches.

3) Fabricate sleeve and transitions of materials (aluminum, galvanized steel or stainless steel) to match damper frame or adjoining duct.
4) Match end connections (flange or sleeve) to field connections.

h. Additional Corrosion Protection for Corrosive Environments:

1) Provide anodized finish, minimum of 0.0007 inch thick, for aluminum surfaces in contact with airstream.
2) Paint surfaces exposed to airstream with an enamel finish. Prepare surfaces to be painted according to paint manufacturer's instructions.
3) Construct axles, damper linkage, and hardware of Type 316L stainless steel.

C. Rectangular Control Dampers with Galvanized-Steel Airfoil Blades and Frames:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Greenheck Fan Corporation.
    b. Johnson Controls, Inc.
    c. Ruskin Company.
    d. Or approved equal.

2. Source Limitations: Obtain rectangular control dampers, with galvanized-steel airfoil blades and frames, from single manufacturer.
3. AMCA Certification: Test, rate, and seal, in accordance with AMCA 511 for air performance and air leakage.
4. Performance:

    a. Leakage:

        1) AMCA 511, Class 1A, at 1 in. wg differential static pressure: Leakage not to exceed 3 cfm/sq. ft. against 1 in. wg differential static pressure when tested in accordance with AMCA 500D.
        2) AMCA 511, Class 1, at 4 in. wg differential static pressure: Leakage not to exceed 8 cfm/sq. ft. against 4 in. wg differential static pressure when tested in accordance with AMCA 500D.

    b. Pressure Drop: 0.06 in. wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500D, figure 5.3.
    c. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/180 of blade length.
    d. Temperature: Minus 40 to plus 250 deg F.
    e. Velocity: Up to 4000 fpm.

5. Construction:

    a. Frame:

        1) Material: ASTM A653/A653M galvanized steel, minimum 0.06 inchthick.
        2) Arrangement: Hat-shaped channel with integral extended face flange(s) having mating face of minimum 1 inch for attachment to duct flanges, plenum walls, and equipment.
        3) Width: Not less than 5 inches.

    b. Blades:

        1) Configuration: Parallel or opposed blade configuration as required by application.
        2) Material: ASTM A653/A653M galvanized steel, 0.05 inch thick.
        3) Shape: Hollow, airfoil.
        4) Length: As required by close-off pressure rating, not to exceed 48 inches.
        5) Width: Not to exceed 8 inches.

    c. Seals:

1) Blades: Replaceable; extruded silicone, vinyl, or damper manufacturer-offered equivalent, as required by performance requirements. Seals are to be mechanically attached in extruded blade slots.
2) Jambs: Stainless steel, compression type.

d. Axles:

1) Diameter: Minimum 0.5 inch.
2) Material: Plated steel.
3) Mechanically attached to blades.

e. Bearings:

1) Material: Molded acetal stainless steel sleeve, as required by operating conditions, mounted in frame.
2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Plated steel.
2) Material: Plated steel.
3) Mounting: Concealed in frame.

g. Transitions with Sleeve:

1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connections.
2) Factory mount damper in a sleeve with a close transition to mate to field connection.

a) Sleeve length not less than 12 inches for dampers without jackshafts and not less than 16 inches for dampers with jackshafts.
b) Oversize damper and sleeve for duct connection size plus minimum 4 inches.

3) Fabricate sleeve and transitions of galvanized steel.
4) Match end connections (flange or sleeve) to field connections.

h. Additional Corrosion Protection for Corrosive Environments:

1) Paint surfaces exposed to airstream with an enamel finish. Prepare surfaces to be painted according to paint manufacturer's instructions.

D. Rectangular Control Dampers with Stainless Steel Airfoil Blades and Frames:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow United Industries.
b. Greenheck Fan Corporation.
c. Ruskin Company.
d. Or approved equal.

2. Source Limitations: Obtain rectangular control dampers, with stainless steel airfoil blades and frames, from single manufacturer.
3. AMCA Certification: Test, rate, and seal, in accordance with AMCA 511 for air performance and air leakage.
4. Performance:

    a. Leakage:

        1) AMCA 511, Class 1A, at 1 in. wg differential static pressure: Leakage not to exceed 3 cfm/sq. ft. against 1 in. wg differential static pressure when tested in accordance with AMCA 500D.
        2) AMCA 511, Class 1, at 4 in. wg differential static pressure: Leakage not to exceed 8 cfm/sq. ft. against 4 in. wg differential static pressure when tested in accordance with AMCA 500D.

    b. Pressure Drop: 0.06 in. wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500D, figure 5.3.
    c. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/180 of blade length.
    d. Temperature: Minus 40 to plus 250 deg F.
    e. Velocity: Up to 4000 fpm.

5. Construction:

    a. Frame:

        1) Material: Type 304 stainless steel, minimum 0.06 inch thick.
        2) Arrangement: Hat-shaped channel with integral extended face flange(s) having mating face of minimum 1 inch for attachment to duct flanges, plenum walls, and equipment.
        3) Width: Not less than 5 inches.

    b. Blades:

        1) Configuration: Parallel or opposed blade configuration as required by application.
        2) Material: Type 304 stainless steel, 0.05 inch thick.
        3) Shape: Hollow, airfoil.
        4) Length: As required by close-off pressure rating, not to exceed 48 inches.
        5) Width: Not to exceed 8 inches.

    c. Seals:

        1) Blades: Replaceable; extruded silicone as required by performance requirements. Seals are to be mechanically attached in extruded blade slots.
        2) Jambs: Stainless steel, compression type.

    d. Axles:

        1) Diameter: Minimum 0.5 inch.
        2) Material: Type 303 or 304 stainless steel.

3) Mechanically attached to blades.

e. Bearings:

1) Material: Molded nylon or stainless steel sleeve, as required by operating conditions, mounted in frame.
2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Stainless steel.
2) Material: Type 304 or 316 stainless steel.
3) Mounting: Concealed in frame.

g. Transitions with Sleeve:

1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connections.
2) Factory mount damper in a sleeve with a close transition to mate to field connection.

a) Sleeve length not less than 12 inches for dampers without jackshafts and not less than 16 inches for dampers with jackshafts.
b) Oversize damper and sleeve for duct connection size plus minimum 4 inches.

3) Fabricate sleeve and transitions of materials to match damper frame.
4) Match end connections (flange or sleeve) to field connections.

2.3 RECTANGULAR CONTROL DAMPERS WITH INSULATED BLADES

A. General Requirements:

1. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.

a. Include multisection damper assemblies with intermediate reinforcing where required between individual sections being joined together. Construct reinforcing of same material (aluminum) as damper frame.

2. Factory install actuator(s) as integral part of damper assembly. Coordinate field requirements for actuators, such as type, fail-safe position, power supply, location, and mounting requirements with damper manufacturer.

B. Rectangular Control Dampers with Insulated Aluminum Airfoil Blades:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Greenheck Fan Corporation.
b. Johnson Controls, Inc.
c. Ruskin Company.

d. TAMCO (T. A. Morrison & Co. Inc.).
e. Or approved equal.

2. Source Limitations: Obtain rectangular control dampers, with insulated aluminum airfoil blades, from single manufacturer.
3. AMCA Certification: Test, rate, and seal, in accordance with AMCA 511 for air performance, air leakage, and thermal performance.
4. Performance:

a. Leakage:

1) AMCA 511, Class 1A, at 1 in. wg differential static pressure: Leakage not to exceed 3 cfm/sq. ft. against 1 in. wg differential static pressure when tested in accordance with AMCA 500D.
2) AMCA 511, Class 1, at 4 in. wg differential static pressure: Leakage not to exceed 8 cfm/sq. ft. against 4 in. wg differential static pressure when tested in accordance with AMCA 500D.

b. Pressure Drop: 0.05 in. wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500D, figure 5.3.
c. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure, not less than 8.0 in. wg.
d. Temperature: Minus 40 to plus 185 deg F.
e. Thermal Performance:

1) R-Value: 2.2 or higher.

f. Velocity: Up to 4000 fpm.

5. Construction:

a. Frame:

1) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, minimum 0.08 inch thick.
2) Arrangement: Hat-shaped channel with integral extended face flange(s) having mating face of minimum 1 inch for attachment to duct flanges, plenum walls, and equipment.
3) Width: Not less than 5 inches.

b. Blades:

1) Configuration: Parallel or opposed blade configuration as required by application.
2) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, 0.07 inch thick.
3) Shape: Airfoil.
4) Length: As required by close-off pressure rating, not to exceed 48 inches.
5) Width: Not to exceed 6 inches.
6) Insulation: Hollow airfoil blade internally insulated with expanded polyurethane foam for thermal performance indicated.
7) Thermal Break: Complete thermal break with blades in full closed position.

c. Seals:

1) Blades: Replaceable; extruded EPDM, Santoprene or silicone, or damper manufacturer-offered equivalent, as required by performance requirements. Seals are to be mechanically attached in extruded blade slots.
2) Jambs: Replaceable; polycarbonate, compression type or mechanically attached extruded silicone.

d. Axles:

1) Diameter: Minimum 0.5 inch.
2) Material: Aluminum or plated steel.
3) Mechanically attached to blades.

e. Bearings:

1) Material: Molded inner and outer bearings of acetal, as required by operating conditions.
2) Mounting: Inner bearing fixed to axle, rotating within an outer bearing inserted in the frame, resulting in no metal-to-metal contact.
3) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Plated steel.
2) Material: Aluminum,.
3) Mounting: Concealed in frame.

g. Transitions with Sleeve:

1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connections.
2) Factory mount damper in a sleeve with a close transition to mate to field connection.

a) Sleeve length not less than 12 inches for dampers without jackshafts and not less than 16 inches for dampers with jackshafts.

3) Fabricate sleeve and transitions of materials (aluminum, galvanized steel, or stainless steel) to match damper frame or adjoining duct.
4) Match end connections (flange or sleeve) to field connections.

h. Additional Corrosion Protection for Corrosive Environments:

1) Provide anodized finish, minimum of 0.0007 inch thick, for aluminum surfaces in contact with airstream.
2) Paint surfaces exposed to airstream with an enamel finish. Prepare surfaces to be painted according to paint manufacturer's instructions.
3) Construct axles, damper linkage, and hardware of Type 316L stainless steel.

C. Rectangular Control Dampers with Insulated Aluminum Airfoil Blades and Thermal Break Frames:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow United Industries.
    b. Greenheck Fan Corporation.
    c. Johnson Controls, Inc.
    d. Ruskin Company.
    e. TAMCO (T. A. Morrison & Co. Inc.).
    f. Or approved equal.

2. Source Limitations: Obtain rectangular control dampers, with insulated aluminum airfoil blades and thermal break, from single manufacturer.
3. AMCA Certification: Test, rate, and seal, in accordance with AMCA 511 for air performance, air leakage, and thermal performance.
4. Performance:

    a. Leakage:

        1) AMCA 511, Class 1A, at 1 in. wg differential static pressure: Leakage not to exceed 3 cfm/sq. ft. against 1 in. wg differential static pressure when tested in accordance with AMCA 500D.
        2) AMCA 511, Class 1, at 4 in. wg differential static pressure: Leakage not to exceed 8 cfm/sq. ft. against 4 in. wg differential static pressure when tested in accordance with AMCA 500D.

    b. Pressure Drop: 0.05 in. wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500D, figure 5.3.
    c. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure, not less than 8.0 in. wg.
    d. Temperature: Minus 40 to plus 185 deg F.
    e. Thermal Performance:

        1) R-Value: 2.2 or higher.
        2) Thermal Efficiency Ratio (E): 345 or higher when tested in accordance with AMCA 500D.

    f. Velocity: Up to 4000 fpm.

5. Construction:

    a. Frame:

        1) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, minimum 0.08 inch thick.
        2) Arrangement: Hat-shaped channel with integral extended face flange(s) having mating face of minimum 1 inch for attachment to duct flanges, plenum walls, and equipment.
        3) Thermal Break: Continuous extruded pocket at two locations, one on each side of closed damper blade, with polyurethane resin fill to achieve frame with no through metal.
        4) Width: Not less than 5 inches.

b. Blades:

1) Configuration: Parallel or opposed blade configuration as required by application.
2) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, 0.07 inch thick.
3) Shape: Airfoil.
4) Length: As required by close-off pressure rating, not to exceed 48 inches.
5) Width: Not to exceed 6 inches.
6) Insulation: Hollow airfoil blade internally insulated with expanded polyurethane foam for thermal performance indicated.
7) Thermal Break: Complete thermal break with blades in full closed position.

c. Seals:

1) Blades: Replaceable; extruded EPDM, Santoprene or silicone, or damper manufacturer-offered equivalent, as required by performance requirements. Seals are to be mechanically attached in extruded blade slots.
2) Jambs: Replaceable; polycarbonate, compression type or mechanically attached extruded silicone.

d. Axles:

1) Diameter: Minimum 0.5 inch.
2) Material: Aluminum or plated steel.
3) Mechanically attached to blades.

e. Bearings:

1) Material: Molded inner and outer bearings of acetal, as required by operating conditions.
2) Mounting: Inner bearing fixed to axle, rotating within an outer bearing inserted in the frame, resulting in no metal-to-metal contact.
3) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Plated steel.
2) Material: Aluminum,.
3) Mounting: Concealed in frame.

g. Transitions with Sleeve:

1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connections.
2) Factory mount damper in a sleeve with a close transition to mate to field connection.

a) Sleeve length not less than 12 inches for dampers without jackshafts and not less than 16 inches for dampers with jackshafts.
b) Oversize damper and sleeve for duct connection size plus minimum 4 inches.

3) Fabricate sleeve and transitions of materials (aluminum, galvanized steel, or stainless steel) to match damper frame or adjoining duct.
4) Match end connections (flange or sleeve) to field connections.

h. Additional Corrosion Protection for Corrosive Environments:

1) Provide anodized finish, minimum of 0.0007 inch thick, for aluminum surfaces in contact with airstream.
2) Paint surfaces exposed to airstream with an enamel finish. Prepare surfaces to be painted according to paint manufacturer's instructions.
3) Construct axles, damper linkage, and hardware of Type 316L stainless steel.

2.4 ROUND CONTROL DAMPERS

A. General Requirements:

1. Factory install actuator as integral part of damper assembly. Coordinate field requirements for actuators, such as type, fail-safe position, power supply, location, and mounting requirements with damper manufacturer.

B. Round, Galvanized-Steel Control Dampers with Sleeve End Connections:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Greenheck Fan Corporation.
b. Johnson Controls, Inc.
c. Ruskin Company.
d. Or approved equal.

2. Source Limitations: Obtain round, galvanized-steel control dampers with sleeve end connections from single manufacturer.
3. Performance:

a. Leakage: Not to exceed 0.15 cfm/in. of perimeter blade at 4 in. wg differential static pressure when tested in accordance with AMCA 500D.
b. Pressure Drop: 0.05 in. wg at 1500 fpm across a 12-inch damper when tested in accordance with AMCA 500D, figure 5.3.
c. Pressure Rating: 4 in. wg.
d. Temperature: Up to 180 deg F.
e. Velocity: Up to 3000 fpm.

4. Size Range: 4 to 24 inches.
5. Construction:

a. Frame:

1) End Connection: Sleeve-type connection for mating to adjacent ductwork.
2) Length: Minimum 6 inches.

3) Material: Galvanized steel, minimum 20 gauge thick.
4) Stiffeners: Outward-turned beads positioned approximately 1-1/2 inches inboard of each end.
5) Standoff: Provide 2-inch- high, sheet metal standoff for mounting actuator to axle while accommodating field-installed duct insulation.

b. Blade: Double-thickness circular flat blades sandwiched together and constructed of galvanized steel.
c. Blade Seal: EPDM, neoprene or silicone seal fully encompassing blade edge.
d. Axle: 0.5-inch- diameter plated steel, mechanically attached to blade.
e. Bearings: Bronze or stainless steel sleeve pressed into frame.

C. Round, Galvanized-Steel Control Dampers with Flanged End Connections:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Greenheck Fan Corporation.
b. Johnson Controls, Inc.
c. Ruskin Company.
d. Or approved equal.

2. Source Limitations: Obtain round, galvanized-steel control dampers with flanged end connections from single manufacturer.
3. Performance:

a. Leakage: Not to exceed 0.15 cfm/in. of perimeter blade at 4 in. wg differential static pressure when tested in accordance with AMCA 500D.
b. Pressure Drop: 0.05 in. wg at 1500 fpm across a 12-inch damper when tested in accordance with AMCA 500D, figure 5.3.
c. Pressure Rating: 4 in. wg.
d. Temperature: Up to 250 deg F.
e. Velocity: Up to 3000 fpm.

4. Size Range: 4 to 48 inches.
5. Construction:

a. Frame:

1) Material: Galvanized steel, thickness as follows:

a) Sizes through 18 Inches in Diameter: Minimum 16 gauge thick.
b) Larger Sizes: Minimum 12 gauge thick.

2) Flanges:

a) Outward-turned flanges with bolt holes on each end of frame for mating to adjacent ductwork.
b) Face: Not less than 1-1/2 inches.
c) Thickness: Minimum 12 gauge thick.

3) Length (Flange Face to Face): Not less than 8 inches.
4) Standoff: Provide 3-inch- high, standoff for mounting actuator to axle while accommodating field-installed duct insulation.

b. Blade: Reinforced double-thickness circular flat blades sandwiched together or reinforced single-thickness circular flat blades; constructed of galvanized steel.

1) Double-Thickness Blades (Each Side):

a) Sizes through 18 Inches: Minimum 18 gauge thick.
b) Larger Sizes: Minimum 16 gauge thick.

2) Single-Thickness Blades:

a) Sizes through 36 Inches: Minimum 14 gauge thick.
b) Larger Sizes: Minimum 12 gauge thick.

c. Blade Stop: Located in airstream; galvanized steel, full-circumference bar or pin.
d. Blade Seal: EPDM, neoprene or silicone, mechanically attached to blade and fully encompassing blade edge. For double-thickness blade designs, sandwich seal between blades.
e. Axle: Continuous, plated steel, mechanically attached to blade and angle reinforced as required.

1) Blade Diameter through 24 Inches: Minimum 1/2-inch axle diameter.
2) Larger Sizes: Minimum 3/4-inch axle diameter.

f. Bearings: Bronze or stainless steel sleeve pressed into frame.

2.5 GENERAL CONTROL-DAMPER ACTUATORS REQUIREMENTS

A. Select actuators to operate related damper(s) with sufficient reserve power to provide smooth modulating action or two-position action and proper speed of response at velocity and pressure conditions to which the damper is subjected.

B. Select actuators with sufficient power and torque to close off against the maximum system pressures encountered. Actuators are to be sized to close off against the fan shutoff pressure as a minimum requirement.

C. The total damper area operated by an actuator is not to exceed 80 percent of manufacturer's maximum area rating.

D. Provide one actuator for each damper assembly where possible. Operate multiple actuators required to drive a single damper assembly in unison.

E. Avoid the use of excessively oversized actuators, which could overdrive and cause linkage failure when the damper blade has reached either its full open or closed position.

F. Use jackshafts and shaft couplings in lieu of blade-to-blade linkages when driving axially aligned damper sections.

G. Provide mounting hardware and linkages for connecting actuator to damper.

H. Select actuators to fail-safe in desired position in the event of a power and signal failure.

I. Actuator Fail-Safe Positions: See Drawings.

2.6 ELECTRIC AND ELECTRONIC CONTROL-DAMPER ACTUATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belimo Aircontrols (USA), Inc.
2. Honeywell Building Solutions; Honeywell International, Inc.
3. Johnson Controls, Inc.
4. Schneider Electric USA, Inc.
5. Siemens Industry, Inc., Building Technologies Division.
6. Or approved equal.

B. Source Limitations: Obtain electric and electronic control-damper actuators from single manufacturer.

C. Type: Motor operated, with or without gears, electric and electronic.

D. Voltage:

1. Unless otherwise noted, 120VAC actuators will be required for two-position dampers. 24VAC must be used for modulating service.
2. Actuator to deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage.
3. Actuator to function properly within a range of 85 to 120 percent of nameplate voltage.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for dampers and instruments installed in duct systems to verify actual locations of connections before installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Furnish and install products required to satisfy most stringent requirements indicated.

B. Properly support dampers and actuators, tubing, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment when subjected to a seismic, wind, or others forces common to the application.

C. Provide ceiling, floor, roof, and wall openings, and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

D. Seal penetrations made in fire-rated and acoustically rated assemblies.

E. Fastening Hardware:

1. Wrenches, pliers, or other tools that will cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

F. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for personnel access, confirm unrestricted ladder placement is possible under occupied condition.

3.4 CONTROL DAMPERS

A. Install smooth transitions, not exceeding 15 degrees, to dampers larger or smaller than adjacent duct. Install transitions as close to damper as possible but at distance to avoid interference and impact to performance. Consult manufacturer for recommended clearance.

B. Clearance:

1. Locate dampers for easy access and provide separate support of dampers that cannot be handled by service personnel without hoisting mechanism.
2. Install dampers with at least 24 inches of clear space on sides of dampers requiring service access unless more space is recommended by manufacturer.

C. Service Access:

1. Install dampers and actuators to be accessible for visual inspection and service.
2. Install access door(s) in duct or equipment located upstream of damper to allow service personnel to hand clean any portion of damper, linkage, and actuator. Comply with requirements in Section 233300 "Air Duct Accessories."

D. Install dampers straight and true, level in all planes, and square in all dimensions.

E. Install supplementary structural reinforcement for large multiple-section dampers if factory-furnished support alone cannot handle loading.

F. Attach field-installed actuator(s) to damper drive shaft.

G. For duct-mounted and equipment-mounted dampers installed outside of equipment, install a visible and accessible indication of damper position from outside.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing is to have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with damper identification on damper and on face of ceiling where damper is concealed above ceiling.

3.6 ELECTRICAL CONNECTIONS

A. Install electrical power to field-mounted control devices requiring electrical power.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

E. Furnish and install circuit breakers. Comply with requirements in other sections of this specification.

F. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

G. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.7 CONTROL CONNECTIONS

A. Pneumatic Control Connections: Connect pneumatic control valve actuators and accessories to pneumatic main and signal air. Comply with requirements in Section 230923 "Direct Digital Control (DDC) System for HVAC."

B. Install control signal wiring to field-mounted control devices.

C. Connect control signal wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.8 CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed surfaces.

3.9 STARTUP

A. Control-Damper Checkout:

1. Check installed products before continuity tests, leak tests, and calibration.
2. Check dampers for proper location and accessibility.
3. Verify that control dampers are installed correctly for flow direction.
4. Verify that proper blade alignment, either parallel or opposed, has been provided.
5. Verify that damper frame attachment is properly secured and sealed.
6. Verify that damper actuator and damper linkage attachment are secure.
7. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
8. Verify that damper blade travel is smooth and unobstructed throughout operating range.

3.10 ADJUSTMENT, CALIBRATION, AND TESTING:

A. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed back to 100 percent open.

B. Stroke control dampers with pilot positioners. Adjust damper and positioner following manufacturer's recommended procedure, so damper is 100 percent closed, 50 percent closed, and 100 percent open at proper air pressure.

C. Check and document open and close cycle times for applications with a cycle time of less than 30seconds.

D. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

END OF SECTION 230923.12

SECTION 230923.13 - ENERGY METERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: The following products that connect to direct-digital control systems:

1. Thermal energy meters.
2. Electric power meters.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Controls" for requirements that relate to Section 230923.13.

1.3 DEFINITIONS

A. Ethernet: Local area network based on IEEE 802.3.1 standards.

B. Firmware: Software (programs or data) that has been written onto read-only memory (ROM). Firmware is a combination of software and hardware. Storage media with ROMs that have data or programs recorded on them are firmware.

C. I/O: Input/output.

D. RMS: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.

E. RS-232: A TIA standard for asynchronous serial data communications between terminal devices.

F. RS-485: A TIA standard for multipoint communications using two twisted pairs.

G. RTD: Resistance temperature detector.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For thermal energy meters electric power meters, include the following:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Operating characteristics, electrical characteristics, and furnished accessories indicating electrical power requirements.
3. Product description with complete technical data, performance curves, and product specification sheets.

B. Sustainable Design Submittals:

1. Product Data for EA Credit 5, "Measurement and Verification": For continuous metering equipment.

C. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each product requiring a certificate.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For energy meters to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 THERMAL ENERGY METERS

A. Performance Requirements: Manufacturer is to certify that each energy meter indicated complies with specified performance requirements and characteristics.

1. Product certificates are required.

B. Inline Ultrasonic Flow Meters (for line sizes 2” and below)

1. Provide an inline flowmeter complete with direct beam wetted ultrasonic transducers, temperature sensor, mounting hardware and calibration certificate.
2. Ultrasonic flow sensing element must utilize matched direct path, wetted ultrasonic transducers and 1000 OHM Platinum RTD.
3. The flow meter must have an accuracy of ±1% of flow over a 25:1 turndown ratio, with an accuracy of ±2% of flow below this ratio.
4. Provide an operator interface consisting of three push-buttons. Display must visually indicate total fluid volume, instantaneous flow rate and fluid temperature. Output signals must be either serial network protocol, pulse output, analog output or combination. Pulse output for totalization of flow, Gallons typical. Optional serial communications output must be native to the BTU meter, BACnet meters must be BTL certified, secondary communication gateways must not be permitted. Information provided via the serial communication network must include: Flow rate, flow total, fluid temperature and a trend including peak values. Meters with serial communications must be able to provide up to three additional auxiliary pulses configured as inputs or outputs.
5. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Onicon (Model F-4600)
    b. Siemens Sitrans
    c. Flexim
    d. Or approved equal.
6. Meter must be provided with BACnet communication output for monitoring at Direct Digital Control System.

C. Ultrasonic Flow Meters (for line sizes above 2")

1. The flow meter must be clamp-on, dual-channel or dual-path transit-time, precluding the requirement of penetrating into the pipe. The dual-channel operating mode must be capable of acting as two (2) independent meters with the ability to perform math functions between the two (2) channels (add or subtract). The dual-path operating mode must eliminate the effects of flow profile distortion, crossflow or swirl errors caused by upstream interference or pumping irregularities. The flow meter must be completely microprocessor-based, utilizing the transit-time flow measurement technique. The flow meter must employ the phase detection multiple-pulse transmit principle in conjunction with multiple-frequency axial beam transducer technology to ensure operation on liquids with solids and/or bubbles. In addition, the flow meter must incorporate an alternate Doppler method measurement mode for highly aerated or heavy solid-bearing liquids.
2. The flow meter must provide automatic transducer spacing utilizing a universal mounting frame or mounting track. The meter must also provide an automatic Reynolds Number and liquid sonic velocity variation compensation and live zero-flow as well as the ability to zero-flow automatically at programmed intervals. The flow meter must have the ability to indicate flow rate, flow velocity, total flow, signal strength, liquid sonic velocity, Reynolds number, and liquid aeration level for both channels or paths. The flow meter must also have the ability to be programmed to compensate for specific upstream profile disturbances. The flow meter must be equipped with an integral front panel keypad and multifunction 240 x 128 pixel LCD display with the ability to display both channels or paths simultaneously. In addition, the flow meter must provide self- and application diagnostics to isolate any fault conditions to either equipment failure or abnormal process conditions. The flow meter must have full help-menu routines corresponding to all levels of programming and operation.

3. The flow meter electronics must be housed in a NEMA 4X enclosure and powered by 115 VAC, 60 Hz. One (1) isolated 4 to 20 mA DC and one (1) 0 to 5,000 Hz pulse output proportional to flow must be provided for each channel or the average of both paths. In addition, the unit must provide one (1) 0-to-10 volt output and four (4) SPDT alarm relays assignable to flow velocity, liquid sonic velocity, signal strength or liquid aeration. An internal 250 KB data logger must be provided to allow storage of all measured and calculated variables and alarms
4. The flow meter must have an accuracy of ±1% of flow over a ± 40 fps flow range. Repeatability must be 0.1% of flow with a flow sensitivity of 0.001 fps at any flow rate, including no-flow conditions.
5. Flow meters that employ amplitude detection/correlation routines or use a single-frequency transducer design must not be acceptable. Shear-mode flow meters or meters utilizing wetted transducers or electrodes, or flow-measuring techniques other than previously described, must not be acceptable.
6. By use of either transit-time or Doppler modes of operation, the flow meter must be capable of measuring all liquids in full sonically conductive pipes. Flow meters that simply offer stand-alone transit-time or Doppler measurement modes must not be acceptable
7. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Onicon
    b. Siemens Sitrans
    c. GE Panametrics
    d. Flexim
    e. Or approved equal.

8. In applications where the meter is not installed in a pipeline with fifteen (15) pipe diameters of straight run (ten (10) upstream and five (5) downstream of meter), meter must be dual-channel type, provided with two (2) sets of flow transducers to increase meter accuracy. In applications where fifteen (15) pipe diameters are available, meter must be single-channel type with one (1) set of flow transducers required.
9. Meter must be provided with BACnet IP communication output for monitoring at Direct Digital Control System.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

C. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install products level, plumb, parallel, and perpendicular with building construction.

B. Support instruments, tubing, piping wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment .

C. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

3.4 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers. Comply with requirements as described in another section of these specifications.

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

END OF SECTION 230923.13

SECTION 230923.14 - FLOW INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Airflow measurement stations and sensors.
2. Airflow switches.
3. Airflow transmitters.
4. Liquid flow meters.
5. Liquid flow sensors (primary elements).
6. Liquid flow switches.
7. Liquid flow transmitters.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control (DDC) System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Controls" for requirements that relate to this Section.

1.3 DEFINITIONS

A. Ethernet: Local area network based on IEEE 802.3 standards.

B. FEP: Fluorinated ethylene propylene.

C. HART: Highway addressable remote transducer protocol is the global standard for sending and receiving digital information across analog wires between smart devices and control or monitoring systems through bi-directional communication that provides data access between intelligent field instruments and host systems. A host can be any software application from technician's hand-held device or laptop to a plant's process control, asset management, safety, or other system using any control platform.

D. PEEK: Polyetheretherketone.

E. PTFE: Polytetrafluoroethylene.

F. PPS: Polyphenylene sulfide.

G. RS-485: A TIA standard for multipoint communications using two twisted pairs.

H. RTD: Resistance temperature detector.

I. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data for the following flow instruments:

1. Airflow measurement stations and sensors.
2. Airflow switches.
3. Airflow transmitters.
4. Liquid flow meters.
5. Liquid flow sensors (primary elements).
6. Liquid flow switches.
7. Liquid flow transmitters.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

C. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Include diagrams for air and process signal tubing.
5. Number-coded identification system for unique identification of wiring, cable, and tubing ends.

D. Engineering Services Submittal:

1. Schedule and design calculations for flow instruments, including the following.

a. Flow at Project design and minimum flow conditions.
b. Pressure drop at Project design and minimum flow conditions.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each product requiring a certificate.

B. Product Test Reports: Tests performed by manufacturer and witnessed by a qualified testing agency for the following:

1. Airflow measurement stations and sensors.
2. Airflow switches.
3. Airflow transmitters.
4. Liquid flow meters.
5. Liquid flow sensors (primary elements).
6. Liquid flow switches.
7. Liquid flow transmitters.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For instruments to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Select and size products to achieve specified performance requirements.

B. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 GENERAL REQUIREMENTS FOR FLOW INSTRUMENTS

A. Air sensors and transmitters are to have an extended range of 10 percent above Project design flow and 10 percent below minimum Project flow to signal abnormal flow conditions and to provide flexibility for changes in operation.

B. Liquid and steam sensors, meters, and transmitters are to have an extended range of 10 percent above Project design flow and 10 percent below Project minimum flow to signal abnormal flow conditions and to provide flexibility for changes in operation.

C. Source Limitations: For flow instruments, obtain products from single source from single manufacturer.

2.3 AIRFLOW MEASUREMENT STATIONS AND SENSORS

A. Performance Requirements:

1. Adjustable for changes in system operational parameters.

2. Airflow Sensor and Transmitter Range: Extended range of 10 percent above Project design flow and 10 percent below minimum Project flow to signal abnormal flow conditions.
3. Manufacturer is to certify that each flow instrument indicated complies with specified performance requirements and characteristics.

    a. Product certificates are required.

B. Thermal Airflow Measurement Stations:

1. Common Performance Requirements:

    a. Provide stations that are adjustable for changes in system operational parameters.
    b. Manufacturer is to certify that each flow instrument indicated complies with specified performance requirements and characteristics.
    c. Thermal airflow stations with one or more sensor nodes mounted in a probe, and a remotely mounted microprocessor-based transmitter at each measurement location.
    d. Sensor Nodes: One self-heated and one zero-power bead-in-glass thermistor, using the principle of thermal dispersion.
    e. Airflow Rate and Temperature of Each Sensor: Equally weighted and averaged by the transmitter prior to output.
    f. Sensor-Node and Probe Assemblies:

        1) Sensor-Node Construction: Two bead-in-glass, hermetically sealed thermistors potted in a marine-grade waterproof epoxy with sensor housings constructed of glass-filled polypropylene. Construct with only the thermistor located within the sensing node and all other electronic components outside the airstream. Epoxy- or glass-encapsulated chip thermistors or devices with exposed leads are not allowed. Devices that use epoxy- or glass-encapsulated chip thermistors, or electronics in the airstream, are unacceptable. Devices with exposed leads are un-acceptable.
        2) Store sensor-node airflow and temperature calibration data in a serial memory chip, in the cable connecting plug. Stored data does not require matching or adjustments to the transmitter in the field.
        3) Sensing-Node Temperature Accuracy: Within 0.15 deg F over an operating range of minus 20 to plus 160 deg F and humidity range of 0 to 100 percent RH.
        4) Sensor-Probe Mounting Bracket Construction: Type 304 stainless steel.
        5) Internal Probe Wiring: Kynar-coated copper between the connecting cable and sensor nodes. PVC-jacketed wiring is unacceptable.
        6) Internal Probe Wiring Connections: Solder joints and spot welds, sealed and protected from the elements, so that direct exposure to water will not affect instrument operation. Connectors within the probe, of any type, are unacceptable. Printed circuit boards within the probe are unacceptable.
        7) Sensor-Probe Jacket: Integral, FEP jacket, plenum-rated CMP/CL2P, UL/cUL-listed cable, rated for exposures from minus 67 to plus 392 deg F, and for continuous and direct UV exposure. Plenum-rated PVC jacket cables are unacceptable.
        8) Sensor-Probe Cable Connector Plug: Gold-plated pins for connection to the transmitter.

    g. Transmitter Features and Functions:

1) High and/or low airflow alarm with user-defined set point and percent of set-point tolerance.
2) Manual or automatic alarm reset, and low-limit cutoff value may be selected to disable the alarm.
3) Alarm delay function, field defined.
4) Sensor-node malfunction via the system status alarm and ignore the sensor node that is in a fault condition.
5) Field configuration, diagnostics, and field output adjustment wizard that allow for a one- or two-point field adjustment to factory calibration for installations that require adjustment.
6) Automatic reset after power disruption, transients, and brown-outs through a watchdog timer circuit.
7) Operating temperature range of minus 20 to plus 120 deg F and humidity range of 5 to 95 percent RH.
8) Electrical Power Requirement: 24 V ac (between 22.8 and 26.4 V ac under load) at 20 VA maximum, using a switching power supply that is overcurrent and overvoltage protected.
9) Printed Circuit Board Interconnects: Gold-plated edge fingers, receptacle plug pins, and printed circuit board test points.
10) Printed Circuit Boards: Electroless nickel immersion gold (ENIG) plated.
11) Integrated Circuitry: Temperature-rated, industrial-grade. Commercial-grade integrated circuitry is not acceptable.
12) Integration Buffers: Separate integration buffers for display of airflow output, airflow signal output (analog and network), and individual sensor output (IR-interface).

2. For Air-Ducted/Plenum:

a. Basis-of-Design Product: Subject to compliance with requirements, provide Ebtron GTC116-P+ or comparable product by one of the following:

1) Johnson Controls, Inc.
2) Ruskin Air Distribution.
3) Or approved equal.

b. Airflow Station Performance:

1) Independent processing of up to 16 separately wired sensor-node assemblies.
2) Accuracy: Within 3 percent of reading for ducted applications, and within 5 percent of reading for non-ducted applications, when installed in accordance with manufacturer's recommended placement guidelines. Include the combined uncertainty of the sensor nodes and transmitter. For devices whose overall accuracy is based on individual accuracy specifications of the sensor probes and transmitter, demonstrate compliance with the accuracy requirement over the entire operating range.

c. Sensor-Node and Probe Assemblies:

1) Performance rated and tested with a 100 percent survival rate in a 30-day saltwater and acid vapor test with written independent laboratory results.

2) Sensor-Node Calibration: Individually calibrated at 16 measurement points to airflow standards directly calibrated at NIST to the NIST Laser Doppler Anemometer (LDA) primary velocity standard.

   a) Accuracy: Within 2 percent of reading over the entire calibrated airflow range of 0 to 5000 fpm.
   b) Individually calibrate thermistor at a minimum of three temperatures to NIST-traceable temperature standards.

3) Provide the number of independent sensor nodes as follows:

   a) For Duct/Plenum Area up to 0.5 sq. ft.: One.
   b) For Duct/Plenum Area Greater Than 0.5 through 1.0 sq. ft.: Two.
   c) For Duct/Plenum Area Greater Than 2.0 through 4.0 sq. ft.: Six.
   d) For Duct/Plenum Area Greater Than 4.0 through 8.0 sq. ft.: Eight.
   e) For Duct/Plenum Area Greater Than 8.0 through 12.0 sq. ft.: 12.
   f) For Duct/Plenum Area Greater Than 12.0 through 14.0 sq. ft.: 14.
   g) For Duct/Plenum Area Greater Than 14.0 sq. ft..

4) For an aspect ratio of 1.5 or less, and an area of 25 sq. ft. or greater, four probes are required.
5) Sensor-Probe Construction: Gold-anodized, 6063 aluminum alloy tube Type 316 stainless steel tube, with each sensor probe containing one or more independently wired sensing nodes.

d. Transmitter:

1) Transmitter determines the average airflow rate and temperature of connected sensor nodes in an array for a single location.
2) User Interface: 16-character, alpha-numeric, LCD display, with two field-selectable analog output signals and network output capability. Provide one of the following transmitter configurations:

   a) Transmitter: Two field-selectable 0- to 5-V dc, 0-to 10-V dc, 4- to 20-mA, scalable, isolated, overcurrent protected analog output signals. The first output (AO1) provides the total airflow rate. The second output (AO2) is field configurable for temperature or low and/or high airflow set-point (user-defined) or system status alarm. The RS-485 (BACnet MS/TP, or Modbus RTU) network connection provides the average airflow rate, temperature, high and/or low airflow set-point alarm, system status alarm, individual sensor-node airflow rates, and individual sensor-node temperatures. The transmitter is to be provided with a Bluetooth low-energy interface card capable of transmitting all transmitter setup parameters, diagnostics, average airflow, and temperature of the device and the airflow and temperature of each sensor node. Software capable of capturing and displaying this transmission will be available via download to Android or iOS phone or tablet. Software is to allow for setup parameters, airflow, temperature, and diagnostic data to be saved on the phone or be emailed.

b) Transmitter: Two field-selectable 0- to 5-V dc, 0- to 10-V dc, 4- to 20-mA, scalable, isolated, and overcurrent protected analog output signals. The first output (AO1) provides the total airflow rate. The second output (AO2) is field configurable for temperature or low and/or high airflow set-point (user-defined) or system status alarm. The Ethernet (BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection provides the average airflow rate, temperature, high and/or low airflow set-point alarm, system status alarm, individual sensor-node airflow rates, and individual sensor-node temperatures. The transmitter is to be provided with a Bluetooth low-energy interface card capable of transmitting all transmitter setup parameters, diagnostics, average airflow, and temperature of the device and the airflow and temperature of each sensor node. Software capable of capturing and displaying this transmission will be available via download to Android or iOS phone or tablet. Software is to allow for setup parameters, airflow, temperature, and diagnostic data to be saved on the phone or be emailed.

c) Transmitter with LonWorks Free Topology Network Interface: Connection capable of providing average airflow and temperature rates across the network.

d) Transmitter with Data-Logger Interface: Capable of logging airflow and temperature rates over specified time intervals.

3. For Air-Ducted/Plenum - Duct Size 2 sq. ft.or Less:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Ebtron, Inc.
2) Ruskin.
3) Air Monitor Corp.
4) Or approved equal.

b. Airflow Station Performance:

1) Independent processing of up to four separately wired sensor-node assemblies.
2) Accuracy: Within 3 percent of reading for ducted applications, and within 5 percent of reading for non-ducted applications, when installed in accordance with manufacturer's recommended placement guidelines. Include the combined uncertainty of the sensor nodes and transmitter. For devices whose overall accuracy is based on individual accuracy specifications of the sensor probes and transmitter, demonstrate compliance with the accuracy requirement over the entire operating range.

c. Sensor-Node and Probe Assemblies:

1) Performance rated and tested with a 100 percent survival rate in a 30-day saltwater and acid vapor test with written independent laboratory test results.
2) Sensor-Node Calibration: Individually calibrated at 16 measurement points to airflow standards directly calibrated at NIST to the NIST Laser Doppler Anemometer (LDA) primary velocity standard.

a) Accuracy: Within 2 percent of reading over the entire calibrated airflow range of 0 to 5000 fpm.

b) Individually calibrate thermistor at a minimum of three temperatures to NIST-traceable temperature standards.

3) Provide the number of independent sensor nodes as follows:

a) For Duct/Plenum Area up to 0.5 sq. ft.: One.
b) For Duct/Plenum Area Greater Than 0.5 through 1.0 sq. ft.: Two.
c) For Duct/Plenum Area Greater Than 1.0 sq. ft.: Four.

4) For probes less than 8 inches
5) Sensor-Probe Construction: Gold-anodized, 6063 aluminum alloy tube Type 316 stainless steel tube, with each sensor probe containing one or more independently wired sensing nodes.

d. Transmitter:

1) Transmitter determines the average airflow rate and temperature of connected sensor nodes in an array for a single location.
2) User Interface: 16-character, alpha-numeric, LCD display, with two field-selectable analog output signals or one isolated RS-485 (BACnet MS/TP, or Modbus RTU) field-selectable network connection.
3) Transmitter, Analog Capability: Two field-selectable 0- 5-V dc, 0- to 10-V dc, 4- to 20-mA, scalable, isolated, and overcurrent protected analog output signals. The first output (AO1) provides the total airflow rate. The second output (AO2) is field configurable for temperature or low and/or high airflow set-point (user-defined) or system status alarm.
4) Transmitter, Network Communications: The RS-485 (BACnet MS/TP or Modbus RTU) network connection provides the average airflow rate, temperature, high and/or low airflow set-point alarm, system status alarm, individual sensor-node airflow rates, and individual sensor-node temperatures.

4. For Supply or Return Fan Array:

a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1) Ebtron, Inc.
2) Ruskin.
3) Air Monitor Corp.
4) Or approved equal.

b. Airflow Station Performance:

1) Independent processing of up to eight separately wired sensor-node assemblies.
2) Accuracy: Within 10 percent of reading under operating conditions, when installed in accordance with manufacturer's sensor density and placement guidelines, with no effect on fan performance. Include the combined uncertainty of the sensor nodes and transmitter. For devices whose overall accuracy is based on individual accuracy specifications of the sensor probes and transmitter, demonstrate compliance with the accuracy requirement over the entire operating range.

c. Sensor-Node and Probe Assemblies:

1) Performance rated and tested with a 100 percent survival rate in a 30-day saltwater and acid vapor test with written independent laboratory test results.
2) Sensor-Node Calibration: Individually calibrated at 16 measurement points to airflow standards directly calibrated at NIST to the NIST Laser Doppler Anemometer (LDA) primary velocity standard.

a) Accuracy: Within 2 percent of reading over the entire calibrated airflow range of 0 to 10,000 fpm.
b) Individually calibrate thermistor at a minimum of three temperatures to NIST-traceable temperature standards.

3) Sensor-Probe Construction: One sensor node mounted on a Type 304 stainless steel block with two adjustable zinc-plated steel rods connected to Type 304 stainless steel pivoting mounting feet.
4) Number of Independent Sensor Nodes, Fan Arrays (One to Eight Fans): One probe with one sensor node per probe in each fan inlet.

d. Transmitter:

1) Transmitter determines the average airflow rate and temperature of each fan. Startup firmware facilitates the setup of multiple fans and fan areas.
2) User Interface: 16-character, alpha-numeric, LCD display, with two field-selectable analog output signals and network output capability. Provide one of the following transmitter configurations:

a) Transmitter: Two field-selectable 0- to 5-V dc, 0- to 10-V dc, or 4- to 20-mA, scalable, isolated, overcurrent protected analog output signals. The first output (AO1) provides the total airflow rate. The second output (AO2) is field configurable for temperature or low and/or high airflow set-point (user-defined) or system status alarm. The RS-485 (BACnet MS/TP, or Modbus RTU) network connection provides the average airflow rate, temperature, high and/or low airflow set-point alarm, system status alarm, individual sensor-node airflow rates, and individual sensor-node temperatures. The transmitter is to be provided with a Bluetooth low-energy interface card capable of transmitting all transmitter setup parameters, diagnostics, average airflow, and temperature of the device and the airflow and temperature of each sensor node. Software capable of capturing and displaying this transmission will be available via download to Android or iOS phone or tablet. Software is to allow for setup parameters, airflow, temperature, and diagnostic data to be saved on the phone or be emailed.

b) Transmitter: Two field-selectable 0- to 5-V dc, 0- to 10-V dc, or 4- to 20-mA, scalable, isolated, and overcurrent protected analog output signals. The first output (AO1) provides the total airflow rate. The second output (AO2) is field configurable for temperature or low and/or high airflow set-point (user-defined) or system status alarm. The Ethernet (BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection provides the average airflow rate, temperature, high and/or low airflow set-point alarm, system status alarm, individual sensor-node airflow rates, and individual sensor-node temperatures. The transmitter is to be provided with a Bluetooth low-energy interface card capable of transmitting all transmitter setup parameters, diagnostics, average airflow, and temperature of the device and the airflow and temperature of each sensor node. Software capable of capturing and displaying this transmission will be available via download to Android or iOS phone or tablet. Software is to allow for setup parameters, airflow, temperature, and diagnostic data to be saved on the phone or be emailed.

c) Transmitter with LonWorks Free Topology Network Interface: Connection capable of providing average airflow and temperature rates across the network.

d) Transmitter with Data-Logger Interface: Capable of logging airflow and temperature rates over specified time intervals.

5. For Air Terminal Units:

   a. Basis-of-Design Product: Subject to compliance with requirements, provide Ebtron ELF series or comparable product by one of the following:

      1) Ebtron, Inc.
      2) Air Monitor.
      3) ELECTRA-Flo SD.
      4) Or approved equal.

6. Airflow Station Performance:

   a. Independent processing of up to two separately wired sensor-node assemblies.
   b. Accuracy: Within 3 percent of reading when installed in accordance with manufacturer's recommended placement guidelines. Include the combined uncertainty of the sensor nodes and transmitter. For devices whose overall accuracy is based on individual accuracy specifications of the sensor probes and transmitter, demonstrate compliance with the accuracy requirement over the entire operating range.

7. Sensor-Node and Probe Assemblies:

   a. Sensor-Node Calibration:

      1) Individually calibrated at a minimum of seven calibration points to NIST-traceable volumetric standards from 0 to 3000 fpm.
      2) Individually calibrate thermistor at a minimum of three temperatures to NIST-traceable temperature standards.

   b. Provide the number of independent sensor nodes as follows:

1) For a Duct Diameter of 4 Inches: One.
2) For Duct Diameters 5 through 16 Inches: Two.

c. Sensor-Probe Construction: Mill-finish, 6063 aluminum alloy tube Type 316 stainless steel tube, with each sensor probe containing one or more independently wired sensing nodes.

8. Transmitter:

a. Transmitter determines the average airflow rate and temperature of all connected sensor nodes in an array for a single location.
b. User Interface: An alpha-numeric, LCD display, with two field-selectable analog output signals or one isolated RS-485 (BACnet MS/TP or Modbus RTU) field-selectable network connection.
c. Transmitter, Analog Capability: Two field-selectable 0- 5-V dc, 1- to 5-V dc, 0- to 10-V dc, 2- to 10-V dc, scalable analog output signals. The first output (AO1) provides the total airflow rate. The second output (AO2) is field configurable for temperature or low and/or high airflow set-point (user-defined) or system status alarm.
d. Transmitter, Network Communications: The RS-485 (BACnet MS/TP or Modbus RTU) network connection provides the average airflow rate, temperature, high and/or low airflow set-point alarm, system status alarm, individual sensor-node airflow rates, and individual sensor-node temperatures.
e. Contact Closure Relay: One dry contact relay with onboard jumper to drive a remote LED, rated for no less than 30 V dc or 24 V ac at 3 A maximum. User configurable as normally open or normally closed during set up.

2.4 AIRFLOW TRANSMITTERS

A. Airflow Transmitter with 0.10 Percent Accuracy and Auto-Zero Feature:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Air Monitor Corporation.
b. Ashcroft.
c. Setra.
d. Or approved equal.

2. Transmitter is to receive total- and static-pressure signals from a primary element, amplify signals, extract the square root, and scale the signals to produce 4- to 20-mA dc output signals linear to airflow.
3. NEMA 250, Type 1 enclosure.
4. Construct assembly so that shock, vibration, and pressures surges of up to 1 psig will neither harm transmitter, nor affect its accuracy.
5. Transmitter with automatic zeroing circuit capable of automatically readjusting transmitter zero at predetermined time intervals. The automatic zeroing circuit is to re-zero transmitter to within 0.1 percent of true zero.
6. Performance:

a. Range: As required by application and at least 10 percent below minimum airflow and 10 percent greater than design airflow.

b. Calibrated Span: Field adjustable, minus 40 percent of the range.
c. Accuracy: Within 0.10 percent of natural span.
d. Repeatability: Within 0.15 percent of calibrated span.
e. Linearity: Within 0.2 percent of calibrated span.
f. Hysteresis and Deadband (Combined): Less than 0.2 percent of calibrated span.

7. Integral digital LED or digital display for continuous indication of airflow.

B. Airflow Transmitters with 0.25 Percent Accuracy and Auto-Zero Feature:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Air Monitor Corporation..
b. Ebtron.
c. Greenheck.
d. Or approved equal.

2. Transmitter is to receive total- and static-pressure signals from a flow element, amplify signals, extract the square foot, and scale the signals to produce 4- to 20-mA dc output signals linear to airflow.
3. NEMA 250, Type 1 enclosure.
4. Construct assembly so shock, vibration, and pressures surges of up to 1 psig will neither harm transmitter, nor affect its accuracy.
5. Transmitter with automatic zeroing circuit capable of automatically readjusting transmitter zero at predetermined time intervals. The automatic zeroing circuit is to re-zero the transmitter to within 0.1 percent of true zero.
6. Performance:

a. Range: As required by application and at least 10 percent below minimum airflow and 10 percent greater than design airflow.
b. Calibrated Span: Field adjustable, minus 40 percent of the range.
c. Accuracy: Within 0.25 percent of natural span.
d. Repeatability: Within 0.15 percent of calibrated span.
e. Linearity: Within 0.2 percent of calibrated span.
f. Hysteresis and Deadband (Combined): Less than 0.2 percent of calibrated span.

7. Integral digital display for continuous indication of airflow.

C. Pressure Differential Transmitters for Airflow Measurement:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Setra System.
b. Ashcroft.
c. Air Monitor Corp.
d. Or approved equal.

2. Performance:

a. Range: As required by application and at least 10 percent below minimum airflow and 10 percent greater than design airflow.
b. Accuracy: Within 0.4 percent of the full-scale range.
c. Hysteresis: Within 0.10 percent of full scale.
d. Repeatability: Within 0.05 percent of full scale.
e. Stability: Within one percent of span per year.
f. Overpressure: 10 psig.
g. Temperature Limits: Zero to 150 deg F.
h. Compensate Temperature Limits: 40 to 150 deg F.
i. Thermal Effects: 0.033 percent of full scale per degree F.
j. Shock and vibration are to not harm the transmitter.

3. Output Signals:

a. Analog Current Signal:

1) Two-wire, 4- to 20-mA dc current source.
2) Signal capable of operating into 800-ohm load.

b. Analog Voltage Signal:

1) Three wire, zero to 10 V.
2) Minimum Load Resistance: 1000 ohms.

4. Display: Four-digit digital with minimum 0.4-inch- high numeric characters.
5. Operator Interface:

a. Zero and span adjustments located behind cover.

6. Construction:

a. Plastic casing with removable plastic cover.
b. Fittings: Swivel fittings for connection to copper tubing or barbed fittings for connection to polyethylene tubing. Fittings on bottom of instrument case.
c. Screw terminal block for wire connections.
d. Vertical plane mounting.
e. NEMA 250, Type 4.
f. Mounting Bracket: Appropriate for installation.

D. Pressure Differential Indicating Transmitter, Switch, and Controller for Airflow Measurement:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dwyer Instruments, Inc.
b. Cleveland Controls.
c. Belimo.
d. Or approved equal.

2. Description:

a. Three-in-one instrument, including digital display, control relay switches, and a transmitter with a current output.
b. Field configurable for pressure, velocity, and volumetric flow applications through user interface.
c. Select instrument range based on application.

3. Performance:

a. Accuracy including hysteresis and repeatability:

1) Ranges Less than 5-Inch wg: Within 1 percent.
2) Other Ranges: Within 0.5 percent at 77 deg F.

b. Stability: Within 1 percent per year.
c. Response Time: 250 ms.
d. Overpressure:

1) Ranges Less than 50-Inch wg: 5 psi
2) Range of 100-Inch wg: 9 psi.

e. Temperature Limits: 32 to 140 deg F.
f. Thermal Effects: 0.020 percent per deg F.
g. Warm-up Period: One hour.

4. Controller: Programming through menu keys to access five menus.

a. Security level.
b. Pressure, velocity, or flow application.
c. Engineering units.
d. K-factor for use with flow application.
e. Set-point control only; set-point and alarm operation; alarm operation as high, low, or high/low with manual; or automatic reset and delay.
f. View high and low readings.
g. Digital dampening for smoothing erratic applications.
h. Scaling of analog output to fit range and field calibration.

5. Display:

a. Four-digit digital, with minimum 0.4-inch- high alphanumeric characters.
b. Four LED indicators; two LEDs for set point and two LEDs for alarm status.

6. Operator Interface:

a. Set-point adjustment through keypad on face of instrument.
b. Zero and span adjustments accessible through menu.
c. Programming through keypad.

7. Output Analog Signal: Two-wire, 4- to 20-mA dc current source; capable of operating into a 900-ohm load.

8. Output Digital Signal: Two, SPDT relays; each rated for 1 A at 30-V ac or 30-V dc.
9. Construction:

    a. Die-cast aluminum casing and bezel.
    b. Connections on side and back.
    c. Vertical plane mounting.
    d. NEMA 250, Type 1 rating.
    e. Nominal 4-inch- diameter face.
    f. Mounting Bracket: Appropriate for installation.

2.5 LIQUID FLOW METERS

A. General Requirements for Liquid Flow Meters:

1. Adjustable for changes in system operational parameters.
2. Liquid and Steam Sensors, Meters, and Transmitters: Extended range of 10 percent above Project design flow and 10 percent below Project minimum flow to signal abnormal flow conditions.
3. Manufacturer is to certify that each flow instrument indicated complies with specified performance requirements and characteristics.
4. Product certificates are required.

B. In-line Body Electromagnetic Flow Meter:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ONICON Incorporated.
    b. Spirax Sarco, Inc.
    c. Dwyer Instruments
    d. Or approved equal.

2. Description:

    a. No moving parts.
    b. Suitable for flow measurement of fluids with electrical conductivity more than 5 micro-Seimens per cm.
    c. Inherent bi-directional flow measurement.
    d. Flow measurement with three pipe diameters upstream and two pipe diameters downstream.
    e. Wet calibrate and tag meters to standards traceable to NIST, and provide each meter with a certificate of calibration.
    f. Transmitter remote from meter.

3. Performance:

    a. Accuracy for Velocities between 3.3 and 33 fps: Within 0.2 percent of reading.
    b. Accuracy for Velocities between 1.0 and 3.3 fps: Within 0.75 percent of reading.
    c. Accuracy for Velocities Less than 1.0 fps.
    d. Ambient Temperature: Minus 4 to plus 140 deg F.
    e. Process Temperature: Minus 4 to 212 deg F.
    f. Pressure: 225 psig.

4. Analog Output Current Signal:

    a. Two-wire, 4- to 20-mA dc current source.
    b. Signal capable of operating into 1000-ohm load.
    c. Isolated.

5. Digital Output Signal: Two, programmable, digital/pulse outputs configurable for frequency, pulse, or directional flow.
6. Operator Interface:

    a. Keypad.
    b. Digital Display: Multiple-line digital display of alphanumerical characters.
    c. LED for normal and alarm operation.

7. Construction:

    a. Body: Epoxy-coated carbon steel Type 316 stainless steel.
    b. Body Liner Material: PTFE Ebonite Polypropylene.
    c. Flow Tube: Type 304 stainless steel.
    d. Connection: 150 Class flange 300 Class flange Threaded Wafer.
    e. Electrodes: Type 316 stainless steel. Quantity determined by manufacturer based on application.
    f. Electronics Enclosure:

        1) Painted aluminum.
        2) Removable cover.
        3) NEMA 250, Type 6.

C. Insertion Electromagnetic Flow Meter:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ONICON Incorporated.
    b. Dwyer Instruments
    c. Badger Meters
    d. Or approved equal.

2. Description:

    a. No moving parts.
    b. Suitable for flow measurement of fluids with electrical conductivity between 20 to 60000 micro-Seimens per centimeter.
    c. Suitable for pipe sizes NPS 3 through NPS 72.
    d. Wet calibrate and tag meters to standards traceable to NIST, and provide each meter with a certificate of calibration.
    e. Continuous auto-zero function.
    f. Transmitter integral to meter.

3. Performance:

a. Flow Range: 0.25 to 20 fps.
b. Accuracy for Velocities between 2 and 20 fps: Within 1 percent of reading.
c. Accuracy for Velocities Less than 2 fps: Within 0.02 fps.
d. Ambient Temperature: Minus 5 to 150 deg F.
e. Process Temperature: 15 to 250 deg F.
f. Pressure: 400 psig.

4. Output Signals:

a. Field-selectable analog signals.

1) Current Signal (Isolated): 4 to 20 mA.
2) Voltage Signal (Isolated): Zero- to 5 10-V dc.

b. Digital Signal: Dry-contact closure signaling fault condition.
c. Frequency Signal: Zero- to 15-V peak pulse, zero to 500 Hz.
d. Scalable Pulse Output:

1) Isolated solid-state dry contact.
2) Contact Rating: 100 mA at 50-V dc.
3) Pulse Duration: 0.5, 1, 2, or 6 seconds.

5. Construction:

a. Wetted Metal Parts: Type 316 stainless steel.
b. Sensor Head: Polysulfone.
c. Process Connection: 1-inch.
d. Instrument Isolation Valve: Full port Type 316 stainless steel ball valve for system isolation.
e. Electrodes: Type 316 stainless steel.
f. Electronics Enclosure:

1) Painted aluminum.
2) Removable cover.
3) NEMA 250, Type 4.
4) Electrical Connection: PVC-jacketed cable, 10 feet long.
5) Conduit Connection:1/2-inch trade size.

6. Display Module:

a. Remote from meter.
b. House in a NEMA 250, Type 4X enclosure.
c. Label terminal strip for all wiring connections.
d. 120-V ac power supply with 24-V dc output to power the flow sensor.
e. Input Signal from Meter: Zero- to 15-V pulse output.
f. Output Signals: Additional output signals furnished with flow meter connected to display module terminal strip.
g. Auxiliary Output Signals:

1) Analog current output (isolated) is to be 4 to 20 mA.

2) Analog voltage output (isolated) is to be zero to 10 V.
3) Digital output (isolated) is to be solid-state dry contacts rated for 100 mA at 50 V.

h. Digital Display:

1) Flow rate.
2) Totalized flow.
3) At least six display digits for flow rate and eight display digits for totalization.
4) Bi-directional units with separate digital display for flow and totalization in each direction.

i. Local reset of flow totalization.
j. Program and data are to be stored in nonvolatile memory in the event of power loss.
k. For bi-directional units, provide LED display of flow direction (contacts open or closed).

2.6 LIQUID FLOW SENSORS (PRIMARY ELEMENTS)

A. Averaging Pitot Tubes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Rosemount; Emerson Process Management.
b. Dwyer.
c. Badger Meters.
d. Or approved equal.

2. Standards: ASME MFC-12M.
3. Description:

a. Sensor is to include isolation valves and connections that are suitable for connecting to a remote pressure instrument.
b. Sensor is to consist of high- and low-pressure plenums and be able to accommodate an integral RTD.
c. Sensor's cross-sectional tee shape is to allow flow separation at a fixed point independent of flow rate, pressure, or temperature with a stable flow coefficient maintained over a wide range of Reynolds numbers.
d. Sensor shape is to promote less-turbulent zones on the backside of the sensor. Individual sensing ports are to be located in this less-turbulent region to measure low pressure. Number of sensing ports are to be a function of the pipe size.
e. High pressure is to be measured by a frontal slot design extending full length of sensor. Number of slots are to be a function of pipe size.
f. Manufacturer is submit on request independent testing documentation (product test reports), demonstrating compliance with specified performance.

4. Performance:

a. Discharge Coefficient Factor: Within 0.75 percent of flow rate.
b. Repeatability: Within 0.1 percent.
c. Flow Turndown: 10:1.

d. Sensor Size for Pipe Size NPS 2 through NPS 8: Minimum rod Reynolds number of 6000; probe width of 0.59 inch.
e. Sensor Size for Pipe Size NPS 6 through NPS 36: Minimum rod Reynolds number of 12500; probe width of 1.060 inch.
f. Sensor Size for Pipe Size NPS 12 through NPS 72: Minimum rod Reynolds number of 25000; probe width of 1.953 inches.
g. Process Temperature Limit: 500 deg F.
h. Process Pressure Limit: Equal to flange rating.

5. Construction:

a. Sensor Surface Finish: Front surface textured for high-Reynolds-number applications to create a more turbulent boundary layer on front surface of sensor and produce a more predictable and repeatable separation of flow at edge of sensor.
b. Sensor Material: Type 316 stainless steel.
c. Packing Gland:

1) Wetted Parts: Type 316 stainless steel.
2) Packing Material: Graphite.

d. Isolation Valve: Type 316 stainless steel full port ball valve configured to remove sensor while isolating process.
e. Flanged In-line Pipe Spool:

1) Mount sensor in a flanged section of pipe.
2) Pipe material to match adjacent pipe.
3) Flanges to match adjacent pipe.

2.7 LIQUID FLOW SWITCHES

A. Liquid Flow Switch (Bellows Type):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dwyer Instruments, Inc,
b. Kobold
c. W.E. Anderson
d. Or approved equal.

2. Description:

a. Field-adjustable four-vane combinations.
b. Field-adjustable set-point adjustment screw.
c. Suitable for pipe sizes NPS 1 through NPS 8.
d. Switch mounted vertically in horizontal pipe.

3. Performance:

a. Flow Rate Actuation and De-actuation: Varies with vane combination and set-point adjustment.

b. Pressure Limit: 145 psig.
c. Temperature Limit: 230 deg F.
d. Electrical Rating: 10 A resistive, 3 A conductive at 250-V ac.
e. Switch Type: SPDT snap switch.

4. Wetted Parts Construction:

a. Bellows: Tin-bronze.
b. Vanes: Stainless steel.
c. Body: Forged brass.
d. Process Connection: NPS 1.

5. Enclosure:

a. Die-cast aluminum alloy.
b. NEMA 250, Type 4.
c. Electrical Connection: Cable gland with attached wire leads.

B. Liquid Flow Switch (Magnetic Type):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dwyer Instruments, Inc.
b. Kobold
c. W.E. Anderson.
d. Or approved equal.

2. Description:

a. Field-adjustable five-vane combinations.
b. Suitable for pipe sizes NPS 1-1/2 through NPS 20.
c. Mounting Suitable for Application: Switch vertically mounted in horizontal pipe, or switch horizontally mounted in vertical pipe with flow up.
d. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for hazardous-environment Class I, Groups C and D; Class II, Groups E, F, and G.

3. Performance:

a. Flow Rate Actuation and De-actuation: Varies with vane combination.
b. Pressure Limit: 1000 psig for brass body, 2000 psig for Type 316 stainless steel body.
c. Temperature Range: Minus 4 to plus 275 deg F.
d. Electrical Rating: 10 A at 125/250-V ac.
e. Switch Type: DPDT snap switch.

4. Wetted Parts Construction:

a. Vanes: Type 316 stainless steel.
b. Body: Brass.
c. Magnetic Keeper: Type 430 stainless steel.
d. Process Connection: NPS 1-1/2.

5. Enclosure:

    a. Die-cast aluminum alloy.
    b. Threaded cover.
    c. NEMA 250, Type 4.
    d. Electrical Connection: Terminal block.
    e. Conduit Connection:3/4-inch trade size.

C. Liquid Flow Switch (Magnetic Type) for Small-Diameter Pipe:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dwyer Instruments, Inc.
    b. Kobold
    c. W.E. Anderson
    d. Or approved equal.

2. Description:

    a. Suitable for pipe sizes NPS 1/2 through NPS 2.
    b. Mounting Suitable for Application: Switch vertically mounted in horizontal pipe, or switch horizontally mounted in vertical pipe with flow up.
    c. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for hazardous-environment Class I, Groups A, B, C, and D; Class II, Groups E, F, and G.

3. Performance:

    a. Flow Rate Actuation and De-actuation: Not adjustable.
    b. Pressure Limit of Body: 1000 psig for brass, 2000 psig for Type 303 stainless steel body.
    c. Pressure Limit of Tee: 250 psig for brass, 1000 psig for malleable iron, and 2000 psig for forged carbon steel and stainless steel.
    d. Temperature Range: Minus 4 to plus 220 deg F.
    e. Electrical Rating: 5 A at 125/250-V ac.
    f. Switch Type: DPDT snap switch.

4. Wetted Parts Construction (Lower Body):

    a. Vanes: Type 301 stainless steel.
    b. Body: Brass.
    c. Magnet: Ceramic.
    d. Process Connection: NPS 1/2.

5. Enclosure (Upper Body):

    a. Brass.
    b. NEMA 250, Type 4.
    c. Electrical Connection: Terminal block.
    d. Conduit Connection: 3/4-inch trade size.

6. Integral Mounting Tee Furnished with Switch:

    a. Brass.
    b. Size: Match adjacent pipe.
    c. Connection: Threaded pipe.

2.8 LIQUID FLOW TRANSMITTERS

A. Pressure Differential Transmitter with 0.07 Percent Accuracy for Flow Measurement:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Rosemount; Emerson Process Management.
    b. Dwyer Instruments.
    c. Kobold.
    d. Or approved equal.

2. FM Approved for hazardous environments.

    a. Intrinsically safe for Classes I, II, and III, Divisions 1 and 2, Groups A through H.
    b. Explosion-Proof for Class I, Division 1, Groups B, C, and D.
    c. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G.
    d. Dust-Ignition-Proof for Class III, Division 1.

3. Performance:

    a. Range: Minus 250- to 250-inch wg.
    b. Span: Field adjustable.
    c. Minimum Span: 2.5-inch wg.
    d. Accuracy: Within 0.07 percent of span or better.
    e. Stability: Within 0.125 percent of upper range limit for 5 years.
    f. Overpressure Limits: 3626 psig.
    g. Process Temperature Limits: Minus 40 to plus 250 deg F.
    h. Ambient Temperature Limits: Minus 40 to plus 185 deg F.
    i. Temperature Effect: Within 0.025 percent of upper range limit plus 0.125 percent of span.
    j. Shock and vibration are to not harm the transmitter.

4. Analog Output Current Signal:

    a. Two-wire, 4- to 20-mA dc current source.
    b. Signal capable of operating into 1000-ohm load.
    c. Digital signal based on HART protocol carried with current signal.
    d. Dampening: Field selectable zero to 30 seconds.

5. Operator Interface: Zero and span adjustments located behind cover.
6. Display: Five-digit, two-line digital display with 0.4 inch high alphanumeric characters.
7. Construction:

a. Nonwetted parts of transmitter constructed of aluminum or stainless steel.
b. Enclosure with removable cover on each side.
c. Wetted parts of transmitter constructed of Type 316 stainless steel.
d. NPS 1/2 process connections on bottom of instrument.
e. Drain/vent valve on low- and high-pressure connections.
f. Two 1/2-inch trade size conduit connection on side of instrument enclosure.
g. Screw terminal block for wire connections.
h. NEMA 250, Type 4X.
i. Mounting bracket suitable for installation.

8. Five-Valve Manifold:

a. Each transmitter is to have integrally mounted manifold.
b. Construct manifold body of Type 316 stainless steel.
c. Manifold is to have NPS 1/2 process connections.

B. Liquid Pressure Differential Transmitter for Flow Measurement:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dwyer Instruments, Inc.
b. W.E. Anderson.
c. Kobold
d. Or approved equal.

2. Performance:

a. Range: Approximately 2 times the set point.
b. Span: Adjustable plus or minus 1 mA, non-interactive.
c. Accuracy: Within 0.25 percent of full scale.
d. Maximum Operating Pressure: 2.5 times range.
e. Temperature Limits: Zero to 175 deg F.
f. Compensate Temperature Limits: 30 to 150 deg F.
g. Thermal Effects: 0.02 percent of full scale per degree F.
h. Response Time: 30 to 50 ms.
i. Shock and vibration are to not harm the transmitter.

3. Analog Output Current Signal:

a. Two wire, 4- to 20-mA dc current source.
b. Signal capable of operating into 1000-ohm load.

4. Operator Interface:

a. Zero and span adjustments located behind cover.
b. Bleed screws on side of body, two screws on low-pressure side and one screw on high-pressure side, for air in line and pressure cavity.

5. Construction:

a. Aluminum and stainless steel enclosure with removable cover.
b. Wetted parts of transmitter constructed of 17-4 PH or 300 series stainless steel.
c. NPS 1/4 process connections on side of instrument enclosure.
d. Knock out for 1/2-inch trade size conduit connection on side of instrument enclosure.
e. Screw terminal block for wire connections.
f. NEMA 250, Type 4X.
g. Mounting bracket is to be suitable for installation.

6. Transmitter is to have three-valve manifold. Construct manifold of brass, bronze, or stainless steel. Manifold is to have NPS 1/4 process connections.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

C. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

D. Provide the services of an independent inspection agency to confirm that proposed mounting locations comply with requirements indicated and approved submittals.

1. Indicate dimensioned locations with mounting height for all surface-mounted products to walls and ceilings on shop drawings.
2. Do not begin installation without submittal approval of mounting location.

E. Complete installation rough-in only after confirmation by independent inspection is complete and approval of location is documented for review by Commissioner on request.

F. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Furnish and install products required to satisfy more stringent of all requirements indicated.

B. Install products level, plumb, parallel, and perpendicular with building construction.

C. Properly support instruments, tubing, piping wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment.

D. Install ceiling, floor, roof, and wall openings and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

E. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

3.4 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers.

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

3.5 INSTRUMENTS, GENERAL INSTALLATION REQUIREMENTS

A. Mounting Location:

1. Rough-in: Outline instrument-mounting locations before setting instruments and routing cable, wiring, tubing, and conduit to final location.
2. Install switches and transmitters for air and liquid flow associated with individual air-handling units and connected ductwork and piping near air-handlings units co-located in air-handling unit system control panel, to provide service personnel a single and convenient location for inspection and service.
3. Install liquid and steam flow switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
4. Install airflow switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
5. Mount switches and transmitters not required to be mounted within system control panels on walls, floor-supported freestanding pipe stands, or floor-supported structural support frames. Use manufacturer mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.
6. Install instruments in steam, liquid, and liquid-sealed-piped services below their process connection point. Slope tubing down to instrument with a slope of 2 percent.

7. Install instruments in dry gas and non-condensable-vapor piped services above their process connection point. Slope process connection lines up to instrument with a minimum slope of 2 percent.

B. Mounting Height:

1. Mount instruments in user-occupied space to match mounting height of light switches unless otherwise indicated on Drawings. Mounting height is to comply with NEC and 2014 NYC Building Codes and accessibility requirements.
2. Mount switches and transmitters, located in mechanical equipment rooms and other similar space not subject to NEC and 2014 NYC Building Codes, including accessibility requirements, within a range of 42 to 72 inches above the adjacent floor, grade, or service catwalk or platform.

    a. Make every effort to mount at 60 inches.

C. Seal penetrations to ductwork, plenums, and air-moving equipment to comply with duct static-pressure class and leakage and seal classes indicated using neoprene gaskets or grommets.

3.6 INSTALLATION OF FLOW INSTRUMENTS

A. Airflow Sensors:

1. Install sensors in straight sections of duct with manufacturer-recommended straight duct upstream and downstream of sensor.
2. Installed sensors are to be accessible for visual inspection and service. Install access door(s) in duct or equipment located upstream of sensor, to allow service personnel to hand clean sensors.

B. Liquid and Steam Sensors:

1. Install sensors in straight sections of piping with manufacturer-recommended straight piping upstream and downstream of sensor.
2. Alert manufacturer where installation cannot accommodate recommended clearance, and solicit recommendations for field modifications to installation, such as flow straighteners, to improve condition.
3. Install pipe reducers for in-line sensors smaller than line size. Position reducers at distance from sensor to avoid interference and impact on accuracy.
4. Install in-line sensors with flanges or unions to provide drop-in and -out installation.

C. Liquid Flow Meters:

1. Install meters in straight sections of piping with manufacturer-recommended straight piping upstream and downstream of sensor.
2. Install pipe reducers for in-line meters smaller than line size. Install reducers at distance from meter to avoid interference and impact on accuracy.
3. Install in-line meters with flanges or unions to provide drop-in and -out installation.
4. Insertion Meters:

    a. Install system process connections full size of meter connection, but not less than NPS 1. Provide stainless steel bushing if required to mate to system connection.

b. Install meter in top dead center of horizontal pipe positioned in an accessible location to allow for inspection and replacement.
c. In applications where top-dead-center location is not possible due to field constraints, install meter at location along top half of pipe if acceptable by manufacturer for mounting orientation.

D. Liquid Switches:

1. Install system process connection full size of switch connection, but not less than NPS 1. Install stainless steel bushing if required to mate switch to system connection.
2. Install switch in top dead center of horizontal pipe positioned in an accessible location to allow for inspection and replacement.
3. In applications where top-dead-center location is not possible due to field constraints, install switch at location along top half of pipe if switch is acceptable by manufacturer for mounting orientation.

E. Transmitters:

1. Install airflow transmitters serving an air system in a single location adjacent to or within system control panel.
2. Install liquid flow transmitters, not integral to sensors, in vicinity of sensor. Where multiple flow transmitters serving same system are located in same room, co-locate transmitters by system to provide service personnel a single and convenient location for inspection and service.

3.7 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing is to have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with instrument identification and on face of ceiling directly below instruments concealed above ceilings.

3.8 CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed interior and exterior surfaces.

B. Wash and shine glazing.

C. Polish glossy surfaces to a clean shine.

3.9 CHECKOUT PROCEDURES

A. Description:

1. Check out installed products before continuity tests, leak tests, and calibration.
2. Check instruments for proper location and accessibility.
3. Check instruments for proper installation with respect to direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.

4. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material, and support.

B. Flow Instrument Checkout:

1. Verify that sensors are installed correctly with respect to flow direction.
2. Verify that sensor attachment is properly secured and sealed.
3. Verify that processing tubing attachment is secure and isolation valves have been provided.
4. Inspect instrument tag against approved submittal.
5. Verify that recommended upstream and downstream distances have been maintained.

3.10 ADJUSTMENT, CALIBRATION, AND TESTING

A. Description:

1. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.
2. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
3. For each analog instrument, make a three-point test of calibration for both linearity and accuracy.
4. Equipment and procedures used for calibration are to meet instrument manufacturer's recommendations.
5. Provide diagnostic and test equipment for calibration and adjustment.
6. Field instruments and equipment used to test and calibrate installed instruments are to have accuracy at least twice the instrument accuracy being calibrated. For example, an installed instrument with an accuracy of 1 percent is to be checked by an instrument with an accuracy of 0.5 percent.
7. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
8. If after-calibration-indicated performance cannot be achieved, replace out-of-tolerance instruments.
9. Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

B. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

C. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

D. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

E. Switches: Calibrate switches to make or break contact at set points indicated.

F. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistance source.

3.11 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate instrumentation and control devices.

B. Coordinate video with operation and maintenance manuals and classroom instruction for use by City of New York in operating, and troubleshooting.

C. Record videos on external hard drive or flash drive.

D. City of New York must have right to make additional copies of video for internal use.

END OF SECTION 230923.14

SECTION 230923.16 - GAS INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Carbon-dioxide sensors and transmitters.
2. Combination carbon-dioxide and VOC sensors and transmitters.
3. Single-point oxygen monitoring system.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Controls" for requirements that relate to this Section.

1.3 DEFINITIONS

A. NDIR: Nondispersive infrared.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Carbon-dioxide sensors and transmitters,
2. Combination carbon-dioxide and VOC sensors and transmitters.
3. Single-point oxygen monitoring system.
4. Multipoint carbon-monoxide monitoring system.
5. VOC sensors and transmitters.

B. Product Data Submittals: For each product.

1. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
2. Installation instructions, including factor affecting performance.
3. Product description with complete technical data, performance curves, product specification sheets.

C. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

D. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include diagrams for power, signal, and control wiring.
3. Number-coded identification system for unique identification of wiring, cable, and tubing ends.

E. Samples: For each exposed product installed in finished space.

F. Coordination Drawings: Plan drawings and corresponding product installation details, drawn to scale, on which wall-mounted instruments located in finished space are shown and coordinated with each other, showing relationship to light switches, fire alarm devices, and other installed devices using input from installers of the items involved.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For carbon-dioxide sensors and transmitters, combination carbon-dioxide and VOC sensors and transmitters, single-point oxygen monitoring system, multipoint carbon-monoxide monitoring system, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gas instruments to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 CARBON-DIOXIDE SENSORS AND TRANSMITTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Building Automation Products Inc.; BAPI.
2. Telaire; a brand of Amphenol Thermometrics Inc.

3. Vaisala.
4. Veris Industries.
5. Or approved equal.

B. Description:

1. NDIR technology or equivalent technology providing long-term stability and reliability.
2. Two-wire, 4-20 mA output signal, linearized to carbon-dioxide concentration in ppm.

C. Construction:

1. House electronics in an ABS plastic enclosure. Provide equivalent of NEMA 250, Type 1 enclosure for wall-mounted space applications and NEMA 250, Type 4 for duct-mounted applications.
2. Equip with digital display for continuous indication of carbon-dioxide concentration.

D. Performance:

1. Measurement Range: Zero to 2000 ppm.
2. Accuracy: Within 2 percent of reading, plus or minus 30 ppm.
3. Repeatability: Within 1 percent of full scale.
4. Temperature Dependence: Within 0.05 percent of full scale over an operating range of 25 to 110 deg F.
5. Long-Term Stability: Within 5 percent of full scale after more than five years.
6. Response Time: Within 60 seconds.
7. Warm-up Time: Within five minutes.

E. Provide calibration kit. Turn over to City of New York at start of warranty period.

2.2 COMBINATION CARBON-DIOXIDE AND VOC SENSORS AND TRANSMITTERS

A. Description:

1. NDIR technology or equivalent technology that provides long-term stability and reliability.
2. Senses and responds to combined concentration of more than 30 contaminants commonly found in indoor environments.

B. Output Signal: Zero to 10-V dc.

C. Performance:

1. Carbon-Dioxide Range: Zero to 2000 ppm.
2. Carbon-Dioxide Accuracy: Within 50 ppm, plus 2 percent measured value.
3. VOC Range: Zero to 2000 ppm.
4. VOC Sensitivity Ranges: Field selectable, low, normal, high.
5. Ambient Temperature: 32 to 122 degrees F.
6. Ambient Relative Humidity: 5 to 95 percent non-condensing.

D. Enclosure: White plastic.

E. Electrical Connections: Screw terminals.

2.3 SINGLE-POINT OXYGEN MONITORING SYSTEM

A. Description:

1. System is to measure and display a single gas concentration, provide local audio and visual alarms when preset limits are exceeded, and send output signals of gas concentration and detected alarms.
2. System is to require no periodic maintenance other than periodic checking of sensor response to a known concentration of gas.
3. System is to be designed to provide for installation, setup, and start-up from outside of unit enclosure without need to open the enclosure door.
4. System is to be factory calibrated and ready for operation after installation.
5. Monitor is to be internally wired to accommodate a single-point field power connection.

B. Performance:

1. Range: Full scale, zero to 25 percent oxygen.
2. Zero Drift: Within 1 percent per year.
3. Span Drift: Within 10 percent per year.
4. Repeatability: Within 1 percent of full scale.
5. Linearity: Within 2 percent of full scale.
6. Step Change Response Time: Within 12 seconds.

C. Enclosure:

1. NEMA 250, Type 4X.
2. Access to the inside of enclosure, as well as to controller, display, and wiring connections, is to be through full-length door on front of enclosure.
3. Door with shatterproof window sized to provide viewing of visual display and indicator lights.
4. Equip enclosure with mounting brackets for the purpose of attaching the unit to a flat surface.
5. Provide door with key lock access to inside enclosure.

D. Controller:

1. Password-protected access through full-function keypad.
2. Set:

    a. Real-time clock.
    b. Alarm levels.
    c. Change span-gas values.
    d. Display date of last calibration.
    e. Display minimum, maximum, and average gas values.
    f. Change address, future calibration time, and date.

3. Automatic return-to-normal-operation feature after calibration.
4. Date stamps last successful calibration.
5. Time and date stamps events.

6. Selectable lockout of output signals during calibration.
7. Logs minimum, maximum, and average gas concentrations over selected time intervals.

E. Visual Display:

1. Four-digit LED or backlight LCD display visible from front face of enclosure.
2. Value displayed is to be a direct reading of gas concentration.
3. Displays system status indicators.
4. Visual Alarm Indication:

    a. Three Separate Alarm Levels: Caution, Warning, and Alarm.
    b. Separate Strobes for Warning and Alarm Conditions: Externally mount the two strobes on top of enclosure.

5. Indication of sensor nearing end of its useful life based on the sensor output, not on the time the sensor was in service.
6. Displays average, minimum, and maximum gas concentrations of the sensor over selected time.
7. Malfunction Indication Alarm: Displays a separate unique character when an over range or under range condition exists, a sensor signal sensor is lost, or a set-point error or memory failure occurs.

F. Audible Alarm:

1. Provides an audible horn when an alarm condition occurs.
2. Horn is to be rated for 95 dB with selectable output tones.
3. Mount horn inside or on exterior of enclosure.
4. Activate horn through a horn relay. Horn relay is to be form "A" contacts and set as normally open and common.

G. Operator Interface:

1. Door Audible Alarm Acknowledge Switch:

    a. Push-button switch located on front door is to silence audible alarm.
    b. Switch is to reset latched alarms if normal gas conditions exist. Visual alarms are to remain on as long as alarms are exceeded.

2. Operating Modes and Parameters Selection: Selections listed are to be accomplished by the use of switches, jumpers, or remote control not involving the use of tools.

    a. Display range value.
    b. Latching or nonlatching mode for the alarm set points.
    c. Upscale or downscale acting alarms.

H. Sensor:

1. Electrochemical fuel-cell type does not require periodic addition of reagents.
2. Sensor is to be replaceable without the need for tools.
3. Sensors are to have a minimum useful life of one year. Replace failed sensors at no charge within first year.

4. Mount sensor externally on the side or bottom of enclosure. Where indicated on Drawings, mount sensor remote from enclosure.
5. Remote Mounting:

    a. Provide sensor in a separate enclosure. Enclosure is to be NEMA 250, Type 4X, except when sensor is installed in a hazardous location, then enclosure is to be an explosion-proof type suitable for the application.
    b. Provide sensor with cable for connecting to monitor.
    c. Provide sensor with mounting hardware suitable for application.
    d. For duct-mounted applications, the sensor installation is to provide kit for calibration of the sensor without removing sensor from duct.

I. Gas Sampling Pump:

1. Where required by application, provide a pump mounted inside the enclosure to provide a motive force to induce flow of gas sample across the sensor.
2. Signal to the sensor from the pump is to be in digital communication format to eliminate radio-frequency interference (RFI) and electromagnetic interference (EMI).
3. A flow sensor is to activate a relay when the gas sample falls below the acceptable flow rate to the sensor and is to indicate a loss of gas flow on the display.
4. Introduction of a calibration gas to the gas sensor is to be through an integral push-button valve. This push-button valve is to return to monitoring the sampled area when released.

J. Calibration:

1. Calibrate and adjust functions through nonintrusive hand-held wireless remote control without opening enclosure door.
2. Enter calibration mode through hand-held wireless remote control unit. The display of the monitor is to instruct the user on when to apply zero and span gas. The system is to automatically adjust its internal settings to the proper calibration values without further intervention by the user. On completion of a successful calibration, the system is to exit the calibration mode. Date stamp of last successful calibration is retained in the system internal memory, with capability to be indicated on display. If calibration is unsuccessful for any reason, the display is to show an unsuccessful calibration attempt and revert to its previous calibration settings.
3. Wireless method is to employ a digitally encoded infrared light beam.
4. Hand-held wireless remote control is to let the user perform sensor zeroing and calibration.
5. Hand-held wireless remote control is to let the user perform sensor zeroing and calibration, as well as activate all functions and features of the monitor.
6. The monitor infrared link is not to be affected by natural and man-made low-level ambient light.

2.4 MULTIPOINT CARBON-MONOXIDE MONITORING SYSTEM

A. Description:

1. Each sampling point is to monitor any variation in the carbon-monoxide concentration level.
2. Each sampling point is to be individually piped to the monitoring system.
3. Provide each sampling point with a 0.3-micron filter.
4. Each sampling point is to be an alarm point.

5. A dual-head diaphragm pump is to draw an air sample through piping system and through a microprocessor-controlled sequencer feeding an analyzer with a new sample every 15 seconds.
6. Analyzer output is to be corrected by the microprocessor.
7. Monitoring system is to have 8 sample points.
8. System is to operate on 120-V ac, single-phase, 60-Hz power.
9. Final adjustment; calibration, testing, and startup of the system are to be performed by a trained representative of manufacturer.

B. Analyzer:

1. Analyzer is to operate using principle of nondispersive infrared absorption.
2. Sampling response time is to be within 10 seconds.
3. Zero drift and span drift are to be less than 1 percent of full scale within a 24-hour period.
4. Repeatability is to be within 1 percent of full scale.
5. Accuracy is to be within 1 percent of full scale.
6. Calibration range is to be zero to 500 ppm.
7. Digital display on analyzer face with scale is to be in ppm.
8. Temperature is to be compensated from 30 to 120 deg F ambient temperature.

C. Control and Display:

1. Each sample is to send a 4-20 mA output signal proportional to the highest concentration.
2. Alphanumeric visual display of current analyzer concentration reading is to be in ppm or another industry-accepted measurement.
3. Visual indication for sample analyzing, sample high-concentration alarm, analyzer malfunction, and calibration.
4. Any number and configuration of sample points is to be capable of being bypassed.
5. Each sample point is to be capable of being manually sampled through an override feature.
6. System parameters are to be stored in nonvolatile memory.
7. Provide at least an eight-hour battery backup of current alarm status. Battery is to be rechargeable.

D. Calibration Equipment:

1. Provide equipment necessary to automatically and manually calibrate the system, including, but not be limited to, the following:

    a. Regular assembly.
    b. Zero cap.
    c. Calibration cap.
    d. Two cylinders filled with calibration gas.
    e. Instruction book.
    f. Carrying case.

2.5 VOC SENSORS AND TRANSMITTERS

A. Description:

1. VOC sensor is to use an oxidizing element that varies resistance with contaminant gases.

2. Senses and responds to combined concentration of more than 30 contaminants commonly found in indoor environments.

B. Performance:

1. Measurement Range: Zero to 100 percent.
2. Ambient Temperature: 32 to 140 deg F.
3. Ambient Relative Humidity: 5 to 95 percent non-condensing.

C. Enclosure: Lexan.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Furnish and install products required to satisfy more stringent of all requirements indicated.

B. Install products level, plumb, parallel, and perpendicular with building construction.

C. Properly support instruments, tubing, piping, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment when subjected to seismic loads.

D. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by using excessive force or oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

E. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

3.2 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers.

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

3.3 INSTRUMENTS, GENERAL INSTALLATION REQUIREMENTS

A. Mounting Location:

1. Install transmitters for gas associated with individual air-handling units and associated connected ductwork and piping near air-handlings units co-located in air-handling unit system control panel, to provide service personnel a single and convenient location for inspection and service.
2. Install gas switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
3. Mount switches and transmitters not required to be mounted within system control panels on walls, floor-supported freestanding pipe stands, or floor-supported structural support frames. Use manufacturer's mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.
4. Install instruments in dry gas and non-condensable vapor piped services above their process connection point. Slope process connection lines up to instrument with a minimum slope of 2 percent.

B. Mounting Height:

1. Mount instruments in user-occupied space to match mounting height of light switches unless otherwise indicated on Drawings. Mounting height is to comply with 2014 NYC Building Codes and accessibility requirements.
2. Mount switches and transmitters located in mechanical equipment rooms and other similar space not subject to 2014 NYC Building Codes accessibility requirements within a range of 42 to 72 inches above the adjacent floor, grade, or service catwalk or platform.

    a. Make every effort to mount at 60 inches.

C. Seal penetrations to ductwork, plenums, and air-moving equipment to comply with duct static-pressure class and leakage and seal classes indicated, using neoprene gaskets or grommets.

3.4 INSTALLATION OF CARBON-MONOXIDE MONITORING SYSTEM

A. Install sample points in monitored area to provide accurate measurement of gas concentration.

B. Install exposed sampling points with a finished appearance consistent with other materials in space. Submit proposed products to be installed for review and approval.

C. Individually install each sample point to the carbon-monoxide monitoring system.

D. Install tubing in a minimum size of NPS 3/8.

E. Use compression fittings at connections to equipment.

F. If not indicated on Drawings, locate carbon-monoxide monitoring system in a secured and serviceable location accessible to authorized personnel.

G. Support carbon-monoxide monitoring system from floor or wall. Support floor-mounted systems using a structural channel frame. Provide mounting brackets.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing is to have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 CHECKOUT PROCEDURES

A. Check out installed products before continuity tests, leak tests, and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that impact performance.

D. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material, and support.

3.7 ADJUSTMENT, CALIBRATION, AND TESTING

A. Description:

1. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.
2. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
3. For each analog instrument, perform a three-point calibration test for both linearity and accuracy.
4. Equipment and procedures used for calibration are to comply with instrument manufacturer's written recommendations.
5. Provide diagnostic and test equipment for calibration and adjustment.
6. Field instruments and equipment used to test and calibrate installed instruments are to have an accuracy of at least twice the instrument accuracy being calibrated. For example, an installed instrument with an accuracy of 1 percent is to be checked by an instrument with an accuracy of 0.5 percent.
7. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
8. If, after calibration, indicated performance cannot be achieved, replace out-of-tolerance instruments.
9. Comply with field-testing requirements and procedures in ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

B. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.

3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

C. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

D. Meters: Check sensors at zero, 50, and 100 percent of Project design values.

E. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

F. Switches: Calibrate switches to make or break contact at set points indicated.

G. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistance source.

END OF SECTION 230923.16

SECTION 230923.18 - LEAK-DETECTION INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes the following types of leak-detection switches:

1. Point-type, leak-detection switches.
2. Cable-type, leak-detection switches.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control (DDC) System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Controls" for requirements that relate to Section 230923.18.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Operating characteristics, electrical characteristics, and furnished accessories indicating control signal, default control signal with loss of power, and electrical power requirements.
2. Product description with complete technical data and product specification sheets.
3. Installation operation and maintenance instructions including factors affecting performance.

B. Shop Drawings:

1. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.
3. Include number-coded identification system for unique identification of wiring, cable, and tubing ends.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: To include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 LEAK-DETECTION SWITCHES

A. Point-Type, Leak-Detection Switches:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Dwyer InDDwyer Instruments.
b. Vertiv/Liebert.
c. W.E. Anderson Sereis WD2.
d. Or approved equal.

2. Features: Audible and visual alarm with relay output for remote indication.
3. Alarm activated based on change in resistance.
4. Performance:

a. Service: Water.
b. Temperature Limits: 32 to 122 deg F.
c. Switch Type: SPDT relay.
d. Electric Connection: Cable attached.

5. Construction: Acrylic, ABS plastic.
6. Field Power: 24-V ac or dc.

B. Cable-Type, Leak-Detection Switches:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. W. E. Anderson Division, Dwyer Instruments, Inc; Series WD.
b. Dwyer Instruments, Inc.
c. Vertiv/Liebert.
d. Or approved equal.

2. Control Module Features:

a. Power and alarm LEDs.
b. Alarm test switch.
c. Continuous tape integrity self check.

3. Performance:

a. Service: Water, or other conductive liquid.
b. Switch Type: DPDT.
c. Electric Connection: Screw terminals.
d. Conduit Connection: 0.5 inch.

4. Construction:

a. Control Module Enclosure: Extruded aluminum.
b. Tape: Hydrophobic with connector on each end.
c. Tape Length: 60 inches. Field extendable.

5. Field Power: 24-V ac or 24- to 30-V dc.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Properly support instruments, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment .

B. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force, or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

C. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

3.4 CONNECTIONS

A. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables"for electrical power connections.

3.5 INSTALLATION

A. Mount switches not required to be mounted within system control panels on walls, floor-supported freestanding pipe stands, or floor-supported structural support frames. Use manufacturer mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing must have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with instrument identification and on face of ceiling directly below instruments concealed above ceilings.

3.7 CHECKOUT PROCEDURES

A. Check installed products before continuity tests and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation for applicable considerations that impact performance.

3.8 ADJUSTMENT, CALIBRATION, AND TESTING

A. Description:

1. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.
2. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
3. Equipment and procedures used for calibration must meet instrument manufacturer's written recommendations.
4. Provide diagnostic and test equipment for calibration and adjustment.
5. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
6. If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.
7. Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

B. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

C. Switches: Calibrate switches to make or break contact at set points indicated.

3.9 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate instrumentation and control devices.

B. Coordinate video with operation and maintenance manuals and classroom instruction for use by City of New York in operating and troubleshooting.

C. Record videos on DVD disks.

D. City of New York will have right to make additional copies of video for internal use without paying royalties.

END OF SECTION 230923.18

SECTION 230923.19 - MOISTURE INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes moisture switches, sensors, and transmitters.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control (DDC) System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Controls" for requirements that relate this Section.
3. SUBMITTAL PROCEDURES

C. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.3 ACTION SUBMITTALS

A. Product Data for the following:

1. Moisture switches.
2. Moisture sensors and transmitters.

B. Shop Drawings:

1. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.
3. Include number-coded identification system for unique identification of wiring, cable, and tubing ends.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: To include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MOISTURE SWITCHES

A. Humidistat for Duct Applications:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Schneider Electric USA, Inc.
b. Fantech
c. Kele.
d. Or approved equal.

2. Description:

a. Two-position control.
b. Field-adjustable set point.
c. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Performance:

a. Relative Humidity Range: 15 to 95 percent.
b. Relative Humidity Differential: 5 percent.
c. Ambient Temperature: 40 to 135 deg F.
d. Voltage: 120-V ac.
e. Current: 7.2 FLA.
f. Switch Type: SPDT snap switch.

4. Construction:

a. Enclosure: Metal, NEMA 250, Type 1.
b. Electrical Connections: Screw terminals.

B. Humidistat for Space Applications:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Schneider Electric USA, Inc.
b. Fantech
c. Kele.
d. Or approved equal.

2. Description:

a. Two-position control.
b. Field-adjustable set point.
c. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Performance:

a. Relative Humidity Range: 10 to 90 percent.
b. Relative Humidity Differential: 5 percent.
c. Ambient Temperature: 40 to 135 deg F.
d. Voltage: 24-V ac.
e. Pilot Duty: 60 VA.
f. Switch Type: SPDT snap switch.

4. Construction:

a. Enclosure: Plastic, NEMA 250, Type 1.
b. Electrical Connections: Cable, 6 inches long.

2.2 MOISTURE SENSORS AND TRANSMITTERS

A. Sensors and Transmitters with Digital Display:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Vaisala Inc.
b. Dwyer.
c. Rosemount.
d. Or approved equal.

2. Performance:

a. Accuracy including non-linearity, hysteresis, and repeatability: Within 2 percent from zero to 90 percent relative humidity and within 2.5 percent from 90 to 100 percent relative humidity when operating between 60 to 77 deg F.
b. Relative Humidity Range: Zero to 100 percent.
c. Factory calibrated and NIST traceable with certificate included.

3. Construction:

a. Provide housing with integral sensor for room applications.
b. Provide housing with remote sensor probe for ducted applications.

1) Duct Sensor Body: 300 series stainless steel or chrome-plated aluminum, at least 2 inches long for duct-mounted applications.
2) Provide sensor with cable for field installation in conduit.
3) For duct-mounted applications, thread the sensor assembly for connection to a threaded mounting flange.

c. Provide general-purpose humidity sensor unless application requires special requirements. Provide sensor with sintered stainless-steel filter for duct applications.
d. Housing to be ABS/PC plastic or powder-coated aluminum.
e. Housing Classification: NEMA 250, Type 4 or 4X.
f. Provide housing with wall-mounting plate.

4. Output Signal: Two-wire, 4- to 20-mA output signal with a drive capacity of at least 500 ohms at 24-V dc.
5. Provide unit with a digital display of relative humidity in percent.

B. Combination Humidity and Temperature Sensor and Transmitter with Display:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Vaisala Inc.
b. Setra.
c. Veris.
d. Or approved equal.

2. Description:

a. Factory package consisting of humidity and temperature sensor, digital display, keypad user interface, installation hardware, interconnecting sensor cabling, installation instructions, and operating manual.
b. Each transmitter to be individually calibrated and provided with NIST traceable calibration certifications.
c. Provide a service cable for connecting to a notebook computer and Microsoft Windows compatible software.

3. Display:

a. Alphanumeric display of the following on the face of the enclosure:

1) Percent relative humidity.
2) Absolute humidity.
3) Mixing ratio.
4) Dry-bulb temperature.
5) Wet-bulb temperature.
6) Dew point temperature.
7) Enthalpy.

b. Visual display of measurement trends, and minimum and maximum values over a one-year period.

4. Electronics Enclosure:

a. Integral to sensors for wall- (room-)mounted applications and remote from temperature and humidity sensors for duct and equipment applications.
b. NEMA 250, Type 4 or 4X.
c. Labeled terminal strip for field wiring connections.

d. 1/2-inchtrade size threaded conduit connection.

5. Programming:

a. Transmitter parameters to be field programmable through keypad on the face of the enclosure.
b. Programmed parameters to be stored in nonvolatile EEPROM.

6. Output Signals:

a. Three Analog Outputs: 4 to 20 mA or 0 to 10-V dc for each output.

7. Temperature Sensor:

a. Temperature range matched to application, but not less than minus 40 to 140 deg F.
b. Within 0.5 deg F accuracy over the temperature range of 50 to 100 deg F and within 1 deg F over the remainder of the range.
c. Provide duct installation kit for duct applications.

8. Humidity Sensor:

a. Relative Humidity Measurement Range: Zero to 100 percent.
b. Response time in still air within 40 seconds.
c. Accuracy including non-linearity, hysteresis, and repeatability:

1) For Temperature between 59 and 77 Deg F and Relative Humidity between Zero and 90 Percent: Within 1 percent.
2) For Temperature between 59 and 77 Deg F and Relative Humidity between 90 and 100 Percent: Within 1.7 percent.
3) For Temperature between Minus 4 and 104 Deg F: Within 1 percent plus 0.008 times relative humidity reading.
4) For Temperature between Minus 40 and 356 Deg F: Within 1.5 percent plus 0.015 times the relative humidity reading.

d. Sintered, stainless-steel filter, protecting sensor.
e. Provide duct installation kit for duct applications.

9. Power Supply:

a. Field Power: 120-V ac, 60 Hz unless otherwise required by the application.
b. Internal Power: As required by transmitter.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install products level, plumb, parallel, and perpendicular with building construction.

B. Properly support instruments, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment .

C. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

D. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

E. Corrosive Environments:

1. Use products that are suitable for environment to which they are subjected.
2. If possible, avoid or limit use of materials in corrosive environments.
3. When conduit is in contact with a corrosive environment, use Type 316 stainless-steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment.
4. Where instruments are located in a corrosive environment and are not corrosive resistant from manufacturer, field install products in a NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

3.4 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers.

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" and 260533.16 "Boxes and Covers for Electrical Systems."

3.5 INSTALLATION OF MOISTURE INSTRUMENTS

A. Mounting Location: Rough-in instrument-mounting locations before setting instruments and routing, cable, wiring, tubing, and conduit to final location.

B. Mounting Height:

1. Mount instruments in user-occupied space to match mounting height of light switches unless otherwise indicated on Drawings. Mounting height to comply with 2014 NYC Buidling Codes and accessibility requirements.
2. Mount switches and transmitters located in mechanical equipment rooms and other similar space not subject to accessibility requirements within a range of 42 to 72 inchesabove the adjacent floor, grade, or service catwalk or platform.

    a. Make every effort to mount at 60 inches.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing to have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with instrument identification on face of ceiling directly below instruments concealed above ceilings.

3.7 CHECKOUT PROCEDURES

A. Check installed products before continuity tests and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that impact performance.

3.8 ADJUSTMENT, CALIBRATION, AND TESTING

A. Description:

1. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

2. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
3. For each analog instrument, make a three-point test of calibration for both linearity and accuracy.
4. Equipment and procedures used for calibration to meet instrument manufacturer's written instructions.
5. Provide diagnostic and test equipment for calibration and adjustment.
6. Field instruments and equipment used to test and calibrate installed instruments to have accuracy at least twice the instrument accuracy being calibrated. For example, an installed instrument with an accuracy of 1 percent to be checked by an instrument with an accuracy of 0.5 percent.
7. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
8. If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.
9. Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

B. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistance source.

C. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

D. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

E. Switches: Calibrate switches to make or break contact at set points indicated.

F. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistance source.

3.9 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate instrumentation and control devices.

B. Coordinate video with operation manuals and classroom instruction for use by City of New York in operating, and troubleshooting.

C. Record videos on an external hard drive or flash drive.

D. City of New York has the right to make additional copies of video for internal use without paying royalties.

END OF SECTION 230923.19

SECTION 230923.22 - POSITION INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Position limit switches for use in direct-digital control (DDC) systems for HVAC.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control" for requirements that relate to this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 POSITION LIMIT SWITCHES

A. Description: Select type of actuating head (plunger, roller lever, or rod) to suit application.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Performance:

1. Life Expectancy: Not less than 30 million mechanical operations and 750,000 electrical operations.
2. Operating Frequency: 300 mechanical operations per minute and 30 electrical operations per minute.
3. Voltage: 125-, 250-, 480-, and 600-V ac or 8-, 12-, 14-, 24-, 30-, 48-, 125-, and 250-V dc, as required by application.

4. Current Rating: As required by application.
5. Temperature Rise: 50 deg C.
6. Ambient Temperature: 14 to 175 deg F.
7. Ambient Relative Humidity: 35 to 95 percent.

C. Construction:

1. NEMA 250, Type 4X enclosure.
2. Switch Type: SPDT or DPDT, as required by application.
3. Status indicator integral to switch. Field switchable to light when contacts are actuated and operating, or contacts are free and not operating.
4. Electrical Connection: Screw or plug-in terminals.
5. Conduit Connection: NPS 1/2.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install products level, plumb, parallel, and perpendicular with building construction.

B. Properly support instruments, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement, sway, or a break in attachment when subjected to a 300lbs force.

C. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not to overstress threads by using excessive force or oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

D. Install products in locations that are accessible and that permit maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

E. Corrosive Environments:

1. Use products that are suitable for environment to which they are subjected.
2. If possible, avoid or limit use of materials in corrosive environments, including, but not limited to:

    a. Laboratory exhaust airstreams.
    b. Process exhaust airstreams.

3. When conduit is in contact with a corrosive environment, use Type 316 stainless steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment.
4. Where instruments are located in a corrosive environment and are not corrosive resistant from the manufacturer, field install products in a NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

3.4 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers.

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

3.5 INSTALLATION OF POSITION INSTRUMENTS

A. Mounting Location:

1. Rough-in instrument-mounting locations before setting instruments and routing, cable, wiring, and conduit to final location.
2. Use manufacturer mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.

B. Seal penetrations to ductwork, plenums, and air-moving equipment to comply with duct static-pressure class and leakage and seal classes indicated, using neoprene gaskets or grommets.

3.6 ADJUSTMENT, CALIBRATION, AND TESTING

A. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

B. Switches: Calibrate switches to make or break contact at set points indicated.

END OF SECTION 230923.22

SECTION 230923.23 - PRESSURE INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Air-pressure sensors.
2. Air-pressure switches.
3. Air-pressure transmitters.
4. Liquid-pressure switches.
5. Liquid-pressure transmitters.

B. Related Requirements:

1. Section 230923 "Direct Digital Control (DDC) System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control" for requirements that relate this Section.

1.3 DEFINITIONS

A. HART: Highway addressable remote transducer protocol is the global standard for sending and receiving digital information across analog wires between smart devices and control or monitoring systems through bi-directional communication that provides data access between intelligent field instruments and host systems. A host can be any software application from technician's hand-held device or laptop to a control, asset management, safety, or other system using any control platform.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each product requiring a certificate.

B. Product Test Reports: For each product requiring test performed by manufacturer and witnessed by a qualified testing agency.

C. Source quality-control reports.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For instruments to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Environmental Conditions:

1. Instruments must operate without performance degradation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified and encountered for installed location.

    a. If instrument alone cannot comply with requirement, install instrument in a protective enclosure that is isolated and protected from conditions impacting performance. Enclosure to be internally insulated, electrically heated and cooled, filtered, and ventilated as required by instrument and application.

2. Instruments and accessories are to be protected with enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. Instruments not available with integral enclosures complying with requirements indicated ae to be housed in protective secondary enclosures. Instrument-installed location to dictate following NEMA 250 enclosure requirements:

    a. Outdoors, Protected: Type 12.
    b. Outdoors, Unprotected: Type 4X.
    c. Indoors, Heated with Filtered Ventilation: Type 2.
    d. Indoors, Heated with Nonfiltered Ventilation: Type 12.
    e. Indoors, Heated and Air-Conditioned: Type 1.
    f. Mechanical Equipment Rooms:

        1) Chiller and Boiler Rooms: Type 4.
        2) Air-Moving Equipment Rooms: Type 12.

    g. Localized Areas Exposed to Washdown: Type 4X.
    h. Within Duct Systems and Air-Moving Equipment Not Exposed to Possible Condensation: Type 2.
    i. Within Duct Systems and Air-Moving Equipment Exposed to Possible Condensation: Type 4.

j. Hazardous Locations: Explosion-proof rating for condition.

2.2 AIR-PRESSURE SENSORS

A. Duct Insertion Static Pressure Sensor:

1. Insertion length to be at 4 inches.
2. Sensor with four radial holes of 0.04-inch diameter.
3. Brass construction.
4. Sensor with threaded end support, sealing washers and nuts.
5. Connection: NPS 1/4 compression fitting.
6. Suitable for flat oval, rectangular, and round duct configurations.

2.3 AIR-PRESSURE SWITCHES

A. Air-Pressure Differential Switch:

1. Diaphragm operated to actuate an SPDT snap switch.

   a. Fan safety shutdown applications: Switch with manual reset.

2. Electrical Connections: Three-screw configuration, including one screw for common operation and two screws for field-selectable normally open or closed operation.
3. Enclosure Conduit Connection: Knock out or threaded connection.
4. User Interface: Screw-type set-point adjustment located inside removable enclosure cover.
5. High and Low Process Connections: Threaded, NPS 1/8.
6. Enclosure:

   a. Dry Indoor Installations: NEMA 250, Type 1.
   b. Outdoor and Wet Indoor Installations: NEMA 250, Type 4.
   c. Hazardous Environments: Explosion proof.

7. Operating Data:

   a. Electrical Rating: 15 A at 120- to 480-V ac.
   b. Pressure Limits:

      1) Continuous: 45 inches wg.
      2) Surge: 10 psig.

   c. Temperature Limits: Minus 30 to 180 deg F.
   d. Operating Range: Approximately 2 times set point.
   e. Repeatability: Within 3 percent.
   f. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Air-Pressure Differential Switch with Set-Point Indicator:

1. Diaphragm operated to actuate an SPDT snap switch.

2. Electrical Connections: Three-screw configuration, including one screw for common operation and two screws for field-selectable normally open or closed operation.
3. Enclosure Conduit Connection: Knock out or threaded connection.
4. User Interface: Screw-type set-point adjustment with enclosed set-point indicator and scale.
5. High and Low Process Connections: Threaded, NPS 1/8.
6. Enclosure:

    a. Dry Indoor Installations: NEMA 250, Type 1.
    b. Outdoor and Wet Indoor Installations: NEMA 250, Type 4.
    c. Hazardous Environments: Explosion proof.

7. Operating Data:

    a. Electrical Rating: 15 A at 120- to 480-V ac.
    b. Pressure Limits:

        1) Continuous: 10 psig.
        2) Surge: 25 psig.

    c. Temperature Limits: Minus 30 to 110 deg F.
    d. Operating Range: Approximately 2 times set point.
    e. Repeatability: Within 1 percent.
    f. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Air-Pressure Differential Switch with Dual Scale Adjustable Set Point:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dwyer Instruments, Inc.
    b. Kobold
    c. W.E. Anderson
    d. Or approved equal.

2. Diaphragm operated to actuate an SPDT snap switch.
3. Electrical Connections: Push-on screw terminals.
4. Enclosure Conduit Connection: Knock out or threaded connection.
5. User Interface: Dual scale set-point adjustment knob located inside removable enclosure cover.
6. High and Low Process Connections: Slip-on tubing connections.
7. Enclosure:

    a. Dry Indoor Installations: NEMA 250, Type 13.

8. Operating Data:

    a. Electrical Rating: 1.5 A at 250-V ac.
    b. Pressure Limits: 40 inches wg
    c. Temperature Limits: Minus 4 to 185 deg F.
    d. Operating Range: Approximately 2 times set point.

D. Air-Pressure Differential Indicating Switch:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dwyer Instruments, Inc.
    b. Kobold
    c. W.E. Anderson
    d. Or approved equal.

2. Combination gage with low- and high-limit switches.
3. Nominal 4-inch- diameter analog indication with white dial face, graduated black markings, pointer to indicate measured value, and a separate adjustable pointer for each switch set point.
4. Switch zero and set-point adjustment screws or knobs on the dial face.
5. Each switch used as a safety limit to have a manual reset button local to switch.
6. Switch Type: Each set point to have two Form C relays, DPDT.
7. Electrical Connections: Screw terminals.
8. Enclosure Conduit Connection: NPS 3/4 threaded connection.
9. High and Low Process Connections: Threaded, NPS 1/8.
10. Enclosure:

    a. Dry Indoor Installations: NEMA 250, Type 1.
    b. Outdoor and Wet Indoor Installations: NEMA 250, Type 4.
    c. Hazardous Environments: Explosion proof.

2.4 AIR-PRESSURE TRANSMITTERS

A. Air-Pressure Differential Transmitters for Hazardous Environments:

1. FM Approved for hazardous environments. Intrinsically safe for Classes I, II, and III, Divisions 1 and 2, Groups A through H.

2. Operator Interface:

    a. Zero and span adjustments within 10 percent of full span.
    b. Potentiometer adjustments located on face of transmitter.

3. Construction:

    a. Type 300 stainless steel enclosure.
    b. Swivel fittings for connection to tubing. Fittings on bottom of instrument enclosure.
    c. Two 1/2-inch trade size conduit connections isolated from electronics.
    d. Screw terminal block for wire connections.
    e. Vertical plane mounting.
    f. NEMA 250, Type 4X.
    g. Mounting Bracket: Appropriate for installation.

4. Reverse wiring protected.
5. Calibrate to NIST-traceable standards and provide each transmitter with a certificate of calibration.

B. Air-Pressure Differential Indicating Transmitter with Field-Selectable Features:

1. Field-Selectable Features:

   a. Field configurable for pressure and velocity applications through user interface.
   b. Field selectable from one of three pressure ranges both in SI (metric) and inch-pound (IP) units of measure.
   c. Select range based on application. Range to be approximately 2 times set point.

2. Performance:

   a. Accuracy Including Hysteresis and Repeatability:

      1) Within 2 percent for 0.10 in. wg, 1.0 in. wg and all bi-directional ranges.
      2) Within 1 percent for other ranges.

   b. Stability: Within 1 percent of full scale per year.
   c. Response Time: Adjustable 0.5- to 15-second time constant with 95 percent response within 1.5 to 45 seconds.
   d. Overpressure: 1 psig maximum operating; 10 psig burst pressure.
   e. Temperature Limits: Zero to 150 deg F.

3. Display: Four-digit digital display with minimum 0.4-inch- high numeric characters.
4. Operator Interface:

   a. Selectable pressure ranges, where indicated.
   b. Zero and span adjustments.
   c. Selectable air velocity mode with square root function.
   d. Adjustable signal dampening

5. Construction:

   a. Plastic casing with removable clear plastic cover.
   b. NPS 3/16 nominal ID plastic tubing connections on side of instrument case for high- and low-pressure connections.
   c. NPS 1/2 NPS threaded connection for conduit.
   d. Terminal block for wire connections.
   e. Vertical plane mounting.
   f. NEMA 250, Type 4X.
   g. Nominal 4-inch- diameter face.
   h. Mounting Bracket: Appropriate for installation.

C. Air-Pressure Differential Transmitter with 0.10 Percent Accuracy and Auto Zero Feature:

1. Description:

   a. 4- to 20-mA dc output signal.
   b. NEMA 250, Type 1 enclosure.

c. Construct the assembly so that shock, vibration, and pressure surges of up to 1 psig will neither harm nor affect the accuracy of the transmitter.
d. Transmitter with automatic zeroing circuit capable of automatically readjusting the transmitter to zero at predetermined time intervals. The automatic zeroing circuit to re-zero the transmitter to within 0.1 percent of true zero.
e. Performance:

1) Range: Approximately 2 times set point.
2) Calibrated Span: Field adjustable, minus 40 percent of the range.
3) Accuracy: Within 0.10 percent of natural span.
4) Repeatability: Within 0.15 percent of calibrated span.
5) Linearity: Within 0.2 percent of calibrated span.
6) Hysteresis and Deadband (Combined): Less than 0.2 percent of calibrated span.

f. Integral digital display for continuous indication of pressure differential.

D. Air-Pressure Differential Transmitter with 0.25 Percent Accuracy and Auto Zero Feature:

1. Description:

a. 4- to 20-mA dc output signal.
b. NEMA 250, Type 1 enclosure.
c. Construct assembly so shock, vibration, and pressure surges of up to 1 psig will neither harm nor affect the accuracy of the transmitter.
d. Transmitter with automatic zeroing circuit capable of automatically readjusting the transmitter to zero at predetermined time intervals. The automatic zeroing circuit to re-zero transmitter to within 0.1 percent of true zero.
e. Performance:

1) Range: As required by application and at least 10 percent below minimum airflow and 10 percent greater than design airflow.
2) Calibrated Span: Field adjustable, minus 40 percent of the range.
3) Accuracy: Within 0.25 percent of natural span.
4) Repeatability: Within 0.15 percent of calibrated span.
5) Linearity: Within 0.2 percent of calibrated span.
6) Hysteresis and Deadband (Combined): Less than 0.2 percent of calibrated span.

f. Integral digital display for continuous indication of pressure differential.

E. Air-Pressure Differential Indicating Transmitter, Switch, and Controller:

1. Description:

a. Three-in-one instrument, including digital display, control relay switches, and a transmitter with a current output.
b. Field configurable for pressure, velocity, and volumetric flow applications through user interface.
c. Select instrument range based on application. Range to be approximately 2 times set point.

2. Performance:

a. Accuracy Including Hysteresis and Repeatability:

1) Within 1 percent for ranges less than 5 in. wg.
2) Within 0.5 percent at 77 deg F for other ranges.

b. Stability: Within 1 percent per year.
c. Response Time: 250 ms.
d. Overpressure: 5 psig for instrument ranges less than 50 in wg and 9 psig for 100 in. wg range.
e. Temperature Limits: 32 to 140 deg F.
f. Thermal Effects: 0.020 percent per degree F.
g. Warm-up Period: One hour.

3. Controller Programming through Menu Keys to Access Five Menus:

a. Security level.
b. Pressure, velocity, or flow application.
c. Engineering units.
d. K-factor for use with flow application.
e. Set-point control only; set-point and alarm operation; and alarm operation as high, low, or high/low with manual or automatic reset and delay.
f. View high and low readings.
g. Digital dampening for smoothing erratic applications.
h. Scaling of analog output to fit range and field calibration.

4. Display:

a. Digital, four-digit display with backlight, with 0.4-inch- high alphanumeric characters.
b. Four indicators; two for set point and two for alarm status.

5. Operator Interface:

a. Set-point adjustment through keypad on face of instrument.
b. Zero and span adjustments accessible through menu.
c. Programming through keypad.

6. Analog Output Signal:

a. Two-wire, 4- to 20-mA dc current source.
b. Signal capable of operating into a 900-ohm load.

7. Digital Output Signal:

a. Two SPDT relays.
b. Each rated for one amp at 30-V ac or dc.

8. Construction:

a. Die cast-aluminum casing and bezel.
b. Threaded, NPS 1/8 connections on side and back.

c. Vertical plane mounting.
d. NEMA 250, Type 1.
e. Nominal 4-inch- diameter face.
f. Mounting Bracket: Appropriate for installation.

2.5 LIQUID-PRESSURE SWITCHES

A. Liquid Gauge Pressure Switch, Diaphragm Operated, Low Pressure:

1. Description:

a. Diaphragm operated to actuate an SPDT snap switch.
b. Electrical Connections: Screw terminal.
c. Enclosure Conduit Connection: Knock out or threaded connection.
d. User Interface: External screw with visual set-point adjustment.
e. Process Connection: Threaded, NPS 1/4.
f. Enclosure:

1) Dry Indoor Installations: NEMA 250, Type 1.
2) Outdoor and Wet Indoor Installations: NEMA 250, Type 4.
3) Hazardous Environments: Explosion proof.

B. Liquid Gauge Pressure Switch-Diaphragm Operated:

1. Electrical Connections: Screw terminal.
2. Enclosure Conduit Connection: Knock out or threaded connection.

3. Enclosure:

a. Dry Indoor Installations: NEMA 250, Type 1, 12.
b. Outdoor and Wet Indoor Installations: NEMA 250, Type 4X.
c. Hazardous Environments: Explosion proof.

2.6 LIQUID-PRESSURE TRANSMITTERS

A. Liquid Gauge Pressure Transmitter with Adjustable Span:

1. Performance:

a. Range: Minus 300 to 300 psig.
b. Span: Field adjustable.
c. Minimum Span: 3 psig.
d. Reference Accuracy: Within 0.07 percent of span or better.
e. Stability: Within 0.125 percent of upper range limit for 5 years.
f. Overpressure Limits: 3626 psig.
g. Process Temperature Limits: Minus 40 to 250 deg F.
h. Ambient Temperature Limits: Minus 40 to 185 deg F.
i. Temperature Effect: Within 0.025 percent of upper range limit plus 0.125 percent of span.
j. Shock and vibration must not harm the transmitter.

2. Analog Output Current Signal:

    a. Two-wire, 4- to 20-mA dc current source.
    b. Signal capable of operating into 1000-ohm load.
    c. Digital signal based on HART protocol carried with current signal.
    d. Dampening: Field selectable from zero to 30 seconds.

3. Operator Interface: Zero and span adjustments located behind cover.
4. Display: Digital, five-digit, two-line display with 0.4-inch- high alphanumeric characters.
5. Construction:

    a. Non-wetted parts of transmitter constructed of aluminum or stainless steel.
    b. Enclosure with removable cover on each side.
    c. Wetted parts of transmitter constructed of Type 316 stainless steel.
    d. Threaded, NPS 1/2 process connection on bottom of instrument.
    e. Drain/vent valve on process connection.
    f. Two 1/2-inch trade size conduit connections on side of instrument enclosure.
    g. Screw terminal block for wire connections.
    h. NEMA 250, Type 4X.
    i. Mounting Bracket: Appropriate for installation.

B. Liquid-Pressure Differential Transmitter with Adjustable Span:

1. Performance:

    a. Range: Minus 300 to 300 psig.
    b. Span: Field adjustable.
    c. Minimum Span: 3 psig.
    d. Reference Accuracy: Within 0.07 percent of span or better.
    e. Stability: Within 0.125 percent of upper range limit for 5 years.
    f. Overpressure Limits: 3626 psig.
    g. Process Temperature Limits: Minus 40 to 250 deg F.
    h. Ambient Temperature Limits: Minus 40 to 185 deg F.
    i. Temperature Effect: Within 0.025 percent of upper range limit plus 0.125 percent of span.
    j. Shock and vibration must not harm the transmitter.

2. Analog Output Current Signal:

    a. Two-wire, 4- to 20-mA dc current source.
    b. Signal capable of operating into 1000-ohm load.
    c. Digital signal based on HART protocol carried with current signal.
    d. Dampening: Field selectable from zero to 30 seconds.

3. Operator Interface: Zero and span adjustments located behind cover.
4. Display: Digital, five-digit, two-line display with 0.4-inch- high alphanumeric characters.
5. Construction:

    a. Non-wetted parts of transmitter constructed of aluminum or stainless steel.
    b. Enclosure with removable cover on each side.

c. Wetted parts of transmitter constructed of Type 316 stainless steel.
d. Threaded, NPS 1/2 process connection on bottom of instrument.
e. Drain/vent valve on process connection.
f. Two 1/2-inch trade size conduit connections on side of instrument enclosure.
g. Screw terminal block for wire connections.
h. NEMA 250, Type 4X.
i. Mounting Bracket: Appropriate for installation.

2.7 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect assembled pressure instruments, as indicated by instrument requirements. Affix standards organization's certification and label.

B. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

C. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install products level, plumb, parallel, and perpendicular with building construction.

B. Properly support instruments, tubing, piping wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement, sway, or a break in attachment when subjected to a 350lbs force.

C. Provide ceiling, floor, roof, wall openings, and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

D. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not to overstress threads by using excessive force or oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

E. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

F. Corrosive Environments:

1. Use products that are suitable for environment to which they are subjected.
2. If possible, avoid or limit use of materials in corrosive environments.
3. When conduit is in contact with a corrosive environment, use Type 316 stainless steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment.
4. Where instruments are located in a corrosive environment and are not corrosive resistant from the manufacturer, field install products in a NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

3.4 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install circuit breakers.

C. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

3.5 INSTALLATION OF PRESSURE INSTRUMENT

A. Mounting Location:

1. Rough-in: Outline instrument-mounting locations before setting instruments and routing, cable, wiring, tubing, and conduit to final location.

2. Install switches and transmitters for air and liquid pressure associated with individual air-handling units and associated connected ductwork and piping near air-handlings units co-located in air-handling unit system control panel, to provide service personnel a single and convenient location for inspection and service.
3. Install liquid and steam pressure switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
4. Install air-pressure switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
5. Mount switches and transmitters not required to be mounted within system control panels on walls, floor-supported freestanding pipe stands, or floor-supported structural support frames. Use manufacturer mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.
6. Install instruments (except pressure gauges) in steam, liquid, and liquid-sealed piped services below their process connection point. Slope tubing down to instrument with a slope of 2 percent.
7. Install instruments in dry gas and noncondensable vapor piped services above their process connection point. Slope process connection lines up to instrument with a minimum slope of 2 percent.

B. Seal penetrations to ductwork, plenums, and air-moving equipment to comply with duct static pressure class and leakage and seal classes indicated using neoprene gaskets or grommets.

C. Duct Pressure Sensors:

1. Install sensors using manufacturer's recommended upstream and downstream distances.
2. Unless indicated on Drawings, locate sensors approximately 75 percent of distance of longest hydraulic run. Location of sensors to be submitted and approved before installation.
3. Install mounting hardware and gaskets to make sensor installation airtight.
4. Route tubing from the sensor to transmitter.
5. Use compression fittings at terminations.
6. Install sensor in accordance with manufacturer's instructions.
7. Support sensor to withstand maximum air velocity, turbulence, and vibration encountered to prevent instrument failure.

D. Outdoor Pressure Sensors:

1. Install roof-mounted sensor in least-noticeable location and as far away from exterior walls as possible.
2. Locate wall-mounted sensor in an inconspicuous location.
3. Submit sensor location for approval before installation.
4. Verify signal from sensor is stable and consistent to all connected transmitters. Modify installation to achieve proper signal.
5. Route outdoor signal pipe full size of sensor connection to transmitters. Install branch connection of size required to match to transmitter.
6. Install sensor signal pipe with dirt leg and drain valve below roof penetration.
7. Insulate signal pipe with flexible elastomeric insulation as required to prevent condensation.
8. Connect roof-mounted signal pipe exposed to outdoors to building grounding system.

E. Air-Pressure Differential Switches:

1. Install air-pressure sensor in system for each switch connection. Install sensor in an accessible location for inspection and replacement.
2. A single sensor may be used to share a common signal to multiple pressure instruments.
3. Install access door in duct and equipment to access sensors that cannot be inspected and replaced from outside.
4. Route NPS 3/8 tubing from sensor to switch connection.
5. Do not mount switches on rotating equipment.
6. Install switches in a location free from vibration, heat, moisture, or adverse effects, which could damage the switch and hinder accurate operation.
7. Install switches in an easily accessible location serviceable from floor.
8. Install switches adjacent to system control panel if within 50 feet; otherwise, locate switch in vicinity of system connection.

F. Liquid-Pressure Differential Switches:

1. Where process connections are located in mechanical equipment room, install switch in convenient and accessible location near system control panel.
2. Where process connections are installed outside mechanical rooms, route processing tubing to mechanical room housing system control panel and locate switch near system control panel.
3. Where multiple switches serving same system are installed in same room, install switches by system to provide service personnel a single and convenient location for inspection and service.
4. System process tubing connection to be full size of switch connection, but not less than NPS 1/2. Install stainless steel bushing if required to mate switch to system connection.
5. Connect process tubing from point of system connection and extend to switch.
6. Install isolation valves in process tubing as close to system connection as practical.
7. Install dirt leg and drain valve at each switch connection.
8. Do not mount switches on rotating equipment.
9. Install switches in a location free from vibration, heat, moisture, or adverse effects, which could damage the switch and hinder accurate operation.
10. Install switches in an easily accessible location serviceable from floor.

G. Liquid-Pressure Transmitters:

1. Where process connections are installed in mechanical equipment room, install transmitter in convenient and accessible location near system control panel.
2. Where process connections are installed outside mechanical rooms, route processing tubing to mechanical room housing system control panel and locate transmitter near system control panel.
3. Where multiple transmitters serving same system are installed in same room, install transmitters by system to provide service personnel a single and convenient location for inspection and service.
4. System process tubing connection to be full size of switch connection, but not less than NPS 1/2. Install stainless steel bushing if required to mate switch to system connection.
5. Connect process tubing from point of system connection and extend to transmitter.
6. Install isolation valves in process tubing as close to system connection as practical.
7. Install dirt leg and drain valve at each transmitter connection.
8. Do not mount transmitters on equipment.
9. Install in a location free from vibration, heat, moisture, or adverse effects, which could damage and hinder accurate operation.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing to have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with instrument identification.

3.7 CHECKOUT PROCEDURES

A. Check out installed products before continuity tests, leak tests, and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation with respect to direction of flow, elevation, orientation, insertion depth, or other applicable considerations that impact performance.

3.8 ADJUSTMENT, CALIBRATION, AND TESTING

A. Description:

1. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.
2. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
3. For each analog instrument, perform a three-point calibration test for both linearity and accuracy.
4. Equipment and procedures used for calibration to comply with instrument manufacturer's recommendations.
5. Provide diagnostic and test equipment for calibration and adjustment.
6. Field instruments and equipment used to test and calibrate installed instruments to have accuracy at least twice the instrument accuracy being calibrated. For example, an installed instrument with an accuracy of 1 percent to be checked by an instrument with an accuracy of 0.5 percent.
7. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
8. If, after calibration, indicated performance cannot be achieved, replace out-of-tolerance instruments.
9. Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

B. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.

C. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

D. Sensors: Check sensors at zero, 50, and 100 percent of project design values.

E. Switches: Calibrate switches to make or break contact at set points indicated.

F. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of project design values.

3.9 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate instrumentation and control devices.

B. Coordinate pressure instrument demonstration video with operation manuals and classroom instruction for use by City of New York in operating and troubleshooting.

C. Record videos on DVD disks.

D. City of New York will have right to make additional copies of video for internal use without paying royalties.

END OF SECTION 230923.23

SECTION 230923.27 - TEMPERATURE INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Air temperature sensors.
2. Combination air temperature sensors and switches.
3. Air temperature switches.
4. Air temperature RTD transmitters.
5. Liquid and steam temperature sensors, commercial grade.
6. Liquid and steam temperature sensors, high-end commercial grade.
7. Liquid and steam temperature sensors, industrial grade.
8. Liquid temperature switches, commercial grade.
9. Liquid and steam temperature transmitters, high-end commercial grade.
10. Liquid and steam temperature transmitters, industrial grade.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Controls" for requirements that relate to this Section.

1.3 DEFINITIONS

A. HART (Highway Addressable Remote Transducer) Protocol: The global standard for sending and receiving digital information across analog wires between smart devices and control or monitoring systems through bidirectional communication that provides data access between intelligent field instruments and host systems. A host can be any software application from a technician's hand-held device or laptop to a plant's process control, asset management, safety, or other system using any control platform.

B. RTD: Resistance temperature detector.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Environmental Conditions:

1. Instruments must operate without performance degradation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified and encountered for installed location.

    a. If instrument alone cannot meet requirement, install instrument in a protective enclosure that is isolated and protected from conditions impacting performance. Enclosure must be internally insulated, electrically heated and cooled, filtered, and ventilated as required by instrument and application.

2. Instruments and accessories must be protected with enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. Instruments not available with integral enclosures complying with requirements indicated must be housed in protective secondary enclosures. Instrument's installed location must dictate following NEMA 250 enclosure requirements:

    a. Outdoors, Protected: Type 12.
    b. Outdoors, Unprotected: Type 4X.
    c. Indoors, Heated with Filtered Ventilation: Type 1.
    d. Indoors, Heated with Non-Filtered Ventilation: Type 12.
    e. Indoors, Heated and Air Conditioned: Type 1.
    f. Mechanical Equipment Rooms:

        1) Chiller and Boiler Rooms: Type 12.
        2) Air-Moving Equipment Rooms: Type 1.

    g. Localized Areas Exposed to Washdown: Type 4X.
    h. Within Duct Systems and Air-Moving Equipment Not Exposed to Possible Condensation: Type 12.
    i. Within Duct Systems and Air-Moving Equipment Exposed to Possible Condensation: Type 4X.
    j. Hazardous Locations: Explosion-proof rating for condition.

2.2 AIR TEMPERATURE SENSORS

A. Platinum RTDs: Common requirements:

1. 100 or 1000 ohms at 0 deg C and a temperature coefficient of 0.00385 ohm/ohm/deg C.
2. Two-wire, PTFE-insulated, 22-gage stranded copper leads.
3. Performance Characteristics:

    a. Range: Minus 50 to 275 deg F.
    b. Interchangeable Accuracy: At 32 deg F within 0.5 deg F.

c. Repeatability: Within 0.5 deg F.
d. Self-Heating: Negligible.

4. Transmitter Requirements:

a. Transmitter required for each 100-ohm RTD.
b. Transmitter optional for 1000-ohm RTD, contingent on compliance with end-to-end control accuracy.

B. Platinum RTD, Single-Point Air Temperature Duct Sensors:

1. 100 or 1000 ohms.
2. Temperature Range: Minus 50 to 275 deg F
3. Probe: Single-point sensor with a stainless steel sheath.
4. Length: As required by application to achieve tip at midpoint of air tunnel, up to 18 inches long.
5. Enclosure: Junction box with removable cover; NEMA 250, Type 1 for indoor applications and Type 4 for outdoor applications.
6. Gasket for attachment to duct or equipment to seal penetration airtight.
7. Conduit Connection: 1/2-inch trade size.

C. Platinum RTD, Air Temperature Averaging Sensors:

1. 100 or 1000 ohms.
2. Temperature Range: Minus 50 to 275 deg F.
3. Multiple sensors to provide average temperature across entire length of sensor.
4. Rigid probe of aluminum, brass, copper, or stainless steel sheath.
5. Flexible probe of aluminum, brass, copper, or stainless steel sheath and formable to a 4-inch radius.
6. Length: As required by application to cover entire cross section of air tunnel.
7. Enclosure: Junction box with removable cover; NEMA 250, Type 1 for indoor applications and Type 4 for outdoor applications.
8. Gasket for attachment to duct or equipment to seal penetration airtight.
9. Conduit Connection: 1/2-inch trade size.

D. Platinum RTD Button Type Temperature Sensors:

1. 100 or 1000 ohms
2. Temperature Range: Minus 40 to 221 deg F.
3. Probe: Housing to be coordinated with Commissioner based on space.
4. Mounting: Direct to wall

E. Platinum RTD Outdoor Air Temperature Sensors:

1. 100 or 1000 ohms.
2. Temperature Range: Minus 50 to 275 deg F.
3. Probe: Single-point sensor with a stainless steel sheath.
4. Solar Shield: Stainless steel.
5. Enclosure: NEMA 250, Type 4 or 4X junction box or combination conduit and outlet box with removable cover and gasket.
6. Conduit Connection: 1/2-inch trade size.

F. Platinum RTD Space Air Temperature Sensors:

1. 100 or 1000 ohms.
2. Temperature Range: Minus 50 to 212 deg F.
3. Provide a mounting plate that is compatible with the surface shape that it is mounted to and electrical box used.
4. Concealed wiring connection.

G. Thermal Resistors (Thermistors): Common requirements:

1. 10,000 ohms at 25 deg C and a temperature coefficient of 23.5 ohms/ohm/deg C.
2. Two-wire, PTFE-insulated, 22-gage stranded copper leads.
3. Performance Characteristics:

    a. Range: Minus 50 to 275 deg F.
    b. Interchangeable Accuracy: At 77 deg F within 0.5 deg F.
    c. Repeatability: Within 0.5 deg F.
    d. Drift: Within 0.5 deg F over 10 years.
    e. Self-Heating: Negligible.

4. Transmitter optional, contingent on compliance with end-to-end control accuracy.

H. Thermistor, Single-Point Duct Air Temperature Sensors:

1. Temperature Range: Minus 50 to 275 deg F.
2. Probe: Single-point sensor with a stainless steel sheath.
3. Length: As required by application to achieve tip at midpoint of air tunnel, up to 18 inches long.
4. Enclosure: Junction box with removable cover; NEMA 250, Type 1 for indoor applications and Type 4 for outdoor applications.
5. Gasket for attachment to duct or equipment to seal penetration airtight.
6. Conduit Connection: 1/2-inch trade size

I. Thermistor Averaging Air Temperature Sensors:

1. Temperature Range: Minus 50 to 275 deg F.
2. Multiple sensors to provide average temperature across entire length of sensor.
3. Rigid probe of aluminum, brass, copper, or stainless steel sheath.
4. Flexible probe of aluminum, brass, copper, or stainless steel sheath and formable to a 4-inch radius.
5. Length: As required by application to cover entire cross section of air tunnel.
6. Enclosure: Junction box with removable cover; NEMA 250, Type 1 for indoor applications and Type 4 for outdoor applications.
7. Gasket for attachment to duct or equipment to seal penetration airtight.
8. Conduit Connection: 1/2-inch trade size.

J. Thermistor Outdoor Air Temperature Sensors:

1. Temperature Range: Minus 50 to 275 deg F.
2. Probe: Single-point sensor with a stainless steel sheath.
3. Solar Shield: Stainless steel.

4. Enclosure: NEMA 250, Type 4 or 4X junction box or combination conduit and outlet box with removable cover and gasket.
5. Conduit Connection: 1/2-inch trade size.

K. Thermistor Space Air Temperature Sensors:

1. Temperature Range: Minus 50 to 212 deg F.
2. Sensor assembly must include a temperature sensing element mounted under a flush, brushed-aluminum cover.
3. Provide a mounting plate that is compatible with the surface shape that it is mounted to and electrical box used.
4. Concealed wiring connection.

L. Space Air Temperature Sensors for Use with Direct Digital Controllers Controllers Controlling Terminal Units:

1. 100- or 1000-ohm platinum RTD or thermistor.
2. Thermistor:

    a. Pre-aged, burned in, and coated with glass; inserted in a metal sleeve; and entire unit encased in epoxy.
    b. Thermistor drift must be less than plus or minus 0.5 deg F over 10 years.

3. Temperature Transmitter Requirements:

    a. Mating transmitter required with each 100-ohm RTD.
    b. Mating transmitters optional for 1000-ohm RTD and thermistor, contingent on compliance with end-to-end control accuracy.

4. Provide digital display of sensed temperature.
5. Provide sensor with local control.

    a. Local override to turn HVAC on.
    b. Local adjustment of temperature set point.
    c. Both features must be capable of manual override through control system operator.

2.3 COMBINATION AIR TEMPERATURE SENSORS AND SWITCHES

A. Source Limitations: Obtain temperature-measuring sensors and transmitters and airflow from single manufacturer.

B. Combination temperature sensor and switch in same instrument.

C. Air Temperature Switch:

1. Factory preset set point of 38 deg F. Field-adjustable set point from 30 to 44 deg F.
2. Responsive to coldest 12-inch section of sensor length.
3. DPST latching relay rated at 25 A and 120-V ac, with powered controller, coil, and manual rest at panel. Wire one leg to fan start circuit and other leg to signal a remote alarm.

D. Air Temperature Sensor:

1. Temperature-averaging type over sensor length. Length to be determined by installing trade to provide uniform coverage over air tunnel. Consult manufacturer for recommendations.
2. Platinum RTD with a value of 1000 ohms at 0 deg C and a temperature coefficient of 0.00385 ohm/ohm/deg C.
3. Accuracy: Within 0.9 deg F.
4. Output Signal: 4 to 20 mA for connection to remote monitoring.
5. Encase RTDs in a flexible nominal 0.375-inch- diameter sheath constructed of brass.
6. Lead wires must be 18-gage AWG copper.
7. Enclosure: NEMA 250, Type 4.

2.4 AIR TEMPERATURE SWITCHES

A. Thermostat and Switch for Low Temperature Control in Duct Applications:

1. Description:

   a. Two-position control.
   b. Field-adjustable set point.
   c. Manual reset.
   d. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Performance:

   a. Operating Temperature Range: 15 to 55 deg F.
   b. Temperature Differential: 5 deg F, non-adjustable and additive.
   c. Enclosure Ambient Temperature: Minus 20 to 140 deg F.
   d. Sensing Element Maximum Temperature: 250 deg F.
   e. Voltage: 120-V ac.
   f. Current: 16 FLA.
   g. Switch Type: Two SPDT snap switches operate on coldest 12-inch section along element length.

3. Construction:

   a. Vapor-Filled Sensing Element: Nominal 20 ft. long.
   b. Dual Temperature Scale: Fahrenheit and Celsius visible on face.
   c. Set-Point Adjustment: Screw.
   d. Enclosure: Painted metal, NEMA 250, Type 1.
   e. Electrical Connections: Screw terminals.
   f. Conduit Connection: 1/2-inch trade size.

B. Thermostat and Switch for High Temperature Control in Duct Applications:

1. Source Limitations: Obtain temperature-measuring sensors and transmitters and airflow from single manufacturer.

2. Description:

   a. Two-position control.
   b. Field-adjustable set point.
   c. Manual reset.
   d. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Performance:

   a. Temperature Range: 100 to 160 deg F.
   b. Temperature Differential: 5 deg F.
   c. Ambient Temperature: Zero to 260 deg F.
   d. Voltage: 120-V ac.
   e. Current: 16 FLA.
   f. Switch Type: SPDT snap switch.

4. Construction:

   a. Sensing Element: Helical bimetal.
   b. Enclosure: Metal, NEMA 250, Type 1.
   c. Electrical Connections: Screw terminals.
   d. Conduit Connection: 1/2-inch trade size.

2.5 AIR TEMPERATURE RTD TRANSMITTERS

A. Source Limitations: Obtain temperature-measuring sensors and transmitters and airflow from single manufacturer.

B. Conduit Connection: 1/2-inch trade size.

C. Functional Characteristics:

1. Input:

   a. 100-ohm platinum RTD temperature coefficient of 0.00385 ohm/ohm/deg C, two-wire sensors.
   b. 1000-ohm platinum RTD temperature coefficient of 0.00385 ohm/ohm/deg C, two-wire sensors.

2. Span (Adjustable):

   a. Space: 40 to 90 deg F.
   b. Supply Air Cooling and Heating: 40 to 120 deg F.
   c. Supply Air Cooling Only: 40 to 90 deg F.
   d. Supply Air Heating Only: 40 to 120 deg F.
   e. Exhaust Air: 50 to 100 deg F.
   f. Return Air: 50 to 100 deg F.
   g. Mixed Air: Minus 40 to 140 deg F.
   h. Outdoor: Minus 40 to 140 deg F.

3. Output: 4- to 20-mA dc, linear with temperature; RFI insensitive; minimum drive load of 600 ohms at 24-V dc.
4. Zero and span field adjustments, plus or minus 5 percent of span. Minimum span of 50 deg F.
5. Match sensor with temperature transmitter and factory calibrate together.

D. Performance Characteristics:

1. Calibration Accuracy: Within 0.1 percent of the span.
2. Stability: Within 0.2 percent of the span for at least 6 months.
3. Combined Accuracy: Within 0.5 percent.

2.6 LIQUID AND STEAM TEMPERATURE SENSORS, COMMERCIAL GRADE

A. Thermowells, Commercial Grade:

1. Process Connection: Threaded, NPS 3/4.
2. Sensor Connection: Threaded, NPS 1/2.
3. Bore: Sized to accommodate sensor with tight tolerance between sensor and well.
4. Furnish thermowells installed in insulated pipes and equipment with an extended neck.
5. Length: 4, 6, or 8 inches as required by application.
6. Thermowells furnished with heat-transfer compound to eliminate air gap between wall of sensor and thermowell and to reduce time constant.

2.7 LIQUID AND STEAM TEMPERATURE SENSORS, HIGH-END COMMERCIAL GRADE

A. RTD, High-End Commercial Grade:

1. Resistance temperature sensors must comply with IEC 60751, Class B requirements.
2. Platinum with a value of 100 ohms at 0 deg C and a temperature coefficient of 0.00385 ohm/ohm/deg C.
3. Encase RTD in a Type 316 stainless steel sheath with a 0.25-inch OD.
4. Provide spring-loaded RTDs for thermowell installations.
5. Performance Characteristics:

a. Range: Minus 328 to 932 deg F.
b. Interchangeable Accuracy: Within 0.54 deg F at 32 deg F.
c. Stability: Within 0.05 percent maximum ice-point resistance shift after 1000 hours at 752 deg F.
d. Hysteresis: Within 0.04 percent of range.
e. Response Time: 62.8 percent of change in 4 seconds with water flowing across sensor at 3 fps.

B. Thermowells, High-End Commercial Grade:

1. Process Connection: Threaded, NPS 3/4.
2. Sensor Connection: Threaded, NPS 1/2.
3. Bore: Sized to accommodate sensor with tight tolerance between sensor and well.

4. Furnish thermowells installed in insulated pipes and equipment with an extended neck that extends beyond the face of the insulation covering.
5. Length: As required by application and pipe size.
6. Thermowells furnished with heat-transfer compound to eliminate air gap between wall of sensor and thermowell and to reduce time constant.

C. Connection Heads, High-End Commercial Grade:

1. Housing: Low-copper cast-aluminum alloy, complying with NEMA 250, Type 4.
2. Terminals: Six or eight as required by sensor.
3. Conduit Connection: 1/2-inch trade size.
4. Sensor Connection: NPS 1/2.

D. Assembly: Sensor manufacturer must furnish sensor, thermowell, and sensor connection head to provide a matched assembly.

2.8 LIQUID AND STEAM TEMPERATURE SENSORS, INDUSTRIAL GRADE

A. RTD, Industrial Grade:

1. Resistance temperature sensors must comply with IEC 60751, Class A requirements.
2. Platinum with a value of 100 ohms at 0 deg C and a temperature coefficient of 0.00385 ohm/ohm/deg C.
3. Encase RTD in a Type 316 stainless steel sheath with a 0.25-inch OD.
4. Provide spring-loaded RTDs for thermowell installations.
5. Performance Characteristics:

    a. Range: Minus 328 to 932 deg F.
    b. Interchangeable Accuracy: Within 0.27 deg F at 32 deg F.
    c. Stability: Within 0.05 percent maximum ice-point resistance shift after 1000 hours at 752 deg F.
    d. Hysteresis: Within 0.04 percent of range.
    e. Response Time: 62.8 percent of change in 4 seconds with water flowing across sensor at 3 fps.
    f. Self-Heating: 18-mW minimum power dissipation required to cause a 1.8 deg F temperature measurement error in water flowing at 3 fps.

B. Thermowells, Industrial Grade:

1. Sensor Connection: Threaded, NPS 1/2.
2. Bore: Sized to accommodate sensor with tight tolerance between sensor and well.
3. Furnish thermowells installed in insulated pipes and equipment with an extended neck that extends beyond the face of the insulation covering.
4. Length: As required by application and pipe size.
5. Thermowells furnished with heat-transfer compound to eliminate air gap between wall of sensor and thermowell and to reduce time constant.

C. Connection Heads, Industrial Grade:

1. Housing: Low-copper cast-aluminum alloy, complying with NEMA 250, Type 4.

2. Terminals: Six or eight as required by sensor, nickel-plated brass.
3. Conduit Connection: 1/2-inch trade size.
4. Sensor Connection: Threaded, NPS 1/2.

D. Assembly: Sensor manufacturer must furnish sensor, thermowell, and sensor connection head to provide a matched assembly.

2.9 LIQUID TEMPERATURE SWITCHES

A. Thermostat and Switch for Temperature Control in Pipe Applications:

1. Description:

a. Two-position control.
b. Field-adjustable set point.
c. Manual reset.
d. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Performance:

a. Operating Temperature Range: 65 to 200 deg F.
b. Temperature Differential Deadband: 5 to 30 deg F, adjustable.
c. Enclosure Ambient Temperature: 150 deg F.
d. Sensing Element Pressure Rating: 200 psig.
e. Voltage: 120-V ac.
f. Current: 8 FLA.
g. Switch Type: SPDT snap switch.

3. Construction:

a. Vapor-Filled Immersion Element: Copper, nominal 3 inches long.
b. Temperature Scale: Fahrenheit, visible on face.
c. Set-Point Adjustment: Screw.
d. Enclosure: Painted metal, NEMA 250, Type 1.
e. Electrical Connections: Screw terminals.
f. Conduit Connection: 3/4-inch trade size.

2.10 LIQUID AND STEAM TEMPERATURE TRANSMITTERS, COMMERCIAL GRADE

A. Performance Characteristics:

1. Calibration Accuracy: Within 0.1 percent of the span.
2. Stability: Within 0.2 percent of the span for at least 6 months.
3. Combined Accuracy: Within 0.5 percent.

2.11 LIQUID AND STEAM TEMPERATURE TRANSMITTERS, INDUSTRIAL GRADE

A. Performance:

1. Digital Accuracy: Within 0.27 deg F with a 180 deg F span.
2. Digital to Analog Accuracy: Within 0.03 percent of span.
3. Total Accuracy: Within 0.32 deg F with a 180 deg F span.
4. Stability: Within 0.15 percent of output reading for 24 months.
5. Ambient Temperature Limits: Minus 4 to 185 deg F.
6. Humidity Limits: Zero to 99 percent.

B. Electronics Enclosure:

1. Materials: Aluminum alloy or stainless steel.
2. NEMA 250, Type 4X enclosure.
3. Conduit Connections: 1/2-inch trade size.
4. Mounting kit to suit application.

C. Functional Characteristics:

1. Range: Minus 328 to 1562 deg F.
2. Field-Adjustable Span: 18 deg F minimum.
3. Default Spans:

    a. Chilled Water: Zero to 100 deg F.
    b. Condenser Water: Zero to 120 deg F.
    c. Heating Hot Water: 32 to 212 deg F.
    d. Heat Recovery: Zero to 120 deg F.

4. Output Signal:

    a. 4- to 20-mA dc, linear with temperature.
    b. Digital signal based on HART protocol carried with current signal.
    c. RFI insensitive.
    d. Minimum drive load of 600 ohms at 24-V dc.

5. Self-Calibration: The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.
6. Digital display of engineering units.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

C. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install products level, plumb, parallel, and perpendicular with building construction.

B. Properly support instruments, tubing, piping, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment .

C. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

D. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

E. Corrosive Environments:

1. Use products that are suitable for environment to which they are subjected.
2. If possible, avoid or limit use of materials in corrosive environments.
3. When conduit is in contact with a corrosive environment, use Type 316 stainless steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment.
4. Where instruments are located in a corrosive environment and are not corrosive resistant from manufacturer, field install products in a NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

3.4 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

3.5 INSTALLATION OF TEMPERATURE INSTRUMENTS

A. Mounting Location:

1. Roughing In:

a. Outline instrument mounting locations before setting instruments and routing cable, wiring, tubing, and conduit to final location.
b. Provide independent inspection to confirm that proposed mounting locations comply with requirements indicated and approved submittals.

1) Indicate dimensioned locations with mounting height for all surface-mounted products on Shop Drawings.
2) Do not begin installation without submittal approval of mounting location.

c. Complete installation rough-in only after confirmation by independent inspection is complete and approval of location is documented for review by Commissioner on request.

2. Install switches and transmitters for air and liquid temperature associated with individual air-handling units and associated connected ductwork and piping near air-handling units co-located in air-handling unit system control panel to provide service personnel a single and convenient location for inspection and service.
3. Install liquid and steam temperature switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
4. Install air temperature switches and transmitters for indoor applications in mechanical equipment rooms. Do not locate in user-occupied space unless indicated specifically on Drawings.
5. Mount switches and transmitters on walls, floor-supported freestanding pipe stands, or floor-supported structural support frames. Use manufacturer's mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.

B. Special Mounting Requirements:

1. Protect products installed outdoors from solar radiation, building and wind effect with stand-offs and shields constructed of Type 316 stainless.
2. Temperature instruments having performance impacted by temperature of mounting substrate must be isolated with an insulating barrier located between instrument and substrate to eliminate effect. Where instruments requiring insulation are located in finished space, conceal insulating barrier in a cover matching the instrument cover.

C. Mounting Height:

1. Mount temperature instruments in user-occupied space to match mounting height of light switches unless otherwise indicated on Drawings. Mounting height must comply with codes and accessibility requirements.
2. Mount switches and transmitters located in mechanical equipment rooms and other similar space not subject to code or state and Federal accessibility requirements within a range of 42 to 72 inches above the adjacent floor, grade, or service catwalk or platform.

    a. Make every effort to mount at 60 inches.

D. Seal penetrations to ductwork, plenums, and air-moving equipment to comply with duct static-pressure class and leakage and seal classes indicated using neoprene gaskets or grommets.

E. Installation of Space Temperature Sensor:

1. Conceal assembly in an electrical box of sufficient size to house sensor and transmitter, if provided.
2. Install electrical box with a faceplate to match sensor cover if sensor cover does not completely cover electrical box.
3. In finished areas, recess electrical box within wall.
4. In unfinished areas, electrical box may be surface mounted if electrical light switches are surface mounted. Use a cast-aluminum electric box for surface-mounted installations.
5. Align electrical box with other electrical devices such as visual alarms and light switches located in the vicinity to provide a neat and well-thought-out arrangement. Where possible, align in both horizontal and vertical axis.

F. Installation of Outdoor Air Temperature Sensor:

1. Mount sensor in a discrete location facing north.
2. Protect installed sensor from solar radiation and other influences that could impact performance.
3. If required to have a transmitter, mount transmitter remote from sensor in an accessible and serviceable location indoors.

G. Installation of Single-Point Duct Temperature Sensor:

1. Install single-point-type, duct-mounted, supply- and return-air temperature sensors. Install sensors in ducts with sensitive portion of the element installed in center of duct cross section and located to sense near average temperature. Do not exceed 24 inches in sensor length.
2. Install return-air sensor in location that senses return-air temperature without influence from outdoor or mixed air.
3. Rigidly support sensor to duct and seal penetration airtight.
4. If required to have transmitter, mount transmitter remote from sensor at accessible and serviceable location.

H. Installation of Averaging Duct Temperature Sensor:

1. Install averaging-type air temperature sensor for temperature sensors located within air-handling units, similar equipment, and large ducts with air tunnel cross-sectional area of 20 sq. ft. and larger.

2. Install sensor length to maintain coverage over entire cross-sectional area. Install multiple sensors where required to maintain the minimum coverage.
3. Fasten and support sensor with manufacturer-furnished clips to keep sensor taut throughout entire length.
4. If required to have transmitter, mount transmitter in an accessible and serviceable location.

I. Installation of Low-Limit Air Temperature Switch:

1. Install multiple low-limit switches to maintain coverage over entire cross-sectional area of air tunnel.
2. Fasten and support sensing element with manufacturer-furnished clips to keep element taut throughout entire length.
3. Mount switches outside of airstream at a location and mounting height to provide easy access for switch set-point adjustment and manual reset.
4. Install on entering side of cooling coil unless otherwise indicated on Drawings.

J. Installation of Liquid Temperature Sensor:

1. Assembly must include sensor, thermowell and connection head.
2. For pipe NPS 4 and larger, install sensor and thermowell length to extend into pipe between 50 to 75 percent of pipe cross section.
3. For pipe smaller than NPS 4:

    a. Install reducers to increase pipe size to NPS 4 at point of thermowell installation.
    b. For pipe sizes NPS 2-1/2 and NPS 3, thermowell and sensor may be installed at pipe elbow or tee to achieve manufacturer-recommended immersion depth in lieu of increasing pipe size.
    c. Minimum insertion depth must be 2-1/2 inches.

4. Install matching thermowell.
5. Fill thermowell with heat-transfer fluid before inserting sensor.
6. Tip of spring-loaded sensors must contact inside of thermowell.
7. For insulated piping, install thermowells with extension neck to extend beyond face of insulation.
8. Install thermowell in top dead center of horizontal pipe positioned in an accessible location to allow for inspection and replacement. If top dead center location is not possible due to field constraints, install thermowell at location along top half of pipe.
9. For applications with transmitters, mount transmitter remote from sensor in an accessible and serviceable location from floor service platform or catwalk.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing must have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with instrument identification and on face of ceiling directly below instruments concealed above ceilings.

3.7 CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed interior and exterior surfaces.

B. Wash and shine glazing.

C. Polish glossy surfaces to a clean shine.

3.8 CHECK-OUT PROCEDURES

A. Check installed products before continuity tests, leak tests, and calibration.

B. Check temperature instruments for proper location and accessibility.

C. Verify sensing element type and proper material.

D. Verify location and length.

E. Verify that wiring is correct and secure.

3.9 ADJUSTMENT, CALIBRATION, AND TESTING

A. Description:

1. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.
2. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
3. For each analog instrument, make a three-point test of calibration for both linearity and accuracy.
4. Equipment and procedures used for calibration must meet instrument manufacturer's written instructions.
5. Provide diagnostic and test equipment for calibration and adjustment.
6. Field instruments and equipment used to test and calibrate installed instruments must have accuracy at least twice the instrument accuracy being calibrated. For example, an installed instrument with an accuracy of 1 percent must be checked by an instrument with an accuracy of 0.5 percent.
7. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
8. If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.
9. Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements and to supplement requirements indicated.

B. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.

3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistance source.

C. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

D. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

E. Switches: Calibrate switches to make or break contact at set points indicated.

F. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistance source.

3.10 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.11 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate temperature instruments.

B. Provide a complete set of instructional videos covering each product specified and installed and showing the following:

1. Software programming.
2. Calibration and test procedures.
3. Operation and maintenance requirements and procedures.
4. Troubleshooting procedures.

C. Coordinate video with operation manuals and classroom instruction for use by City of New York in operating and troubleshooting.

D. Record videos on external hard drive or flash drive.

E. City of New York has the right to make additional copies of video for internal use without paying royalties.

END OF SECTION 230923.27

SECTION 230993.11 - SEQUENCE OF OPERATIONS FOR HVAC DIRECT DIGITAL CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes control sequences for Direct Digital Control for HVAC systems, subsystems, and equipment.

B. Related Requirements:

1. Section 230923 "Direct Digital Control Systems for HVAC" for control equipment.

1.3 DEFINITIONS

A. Analog Output: Proportional output signal (zero- to 10-V dc, 4 to 20 mA).

B. Binary Output: On/off output signal or contact closure.

C. Digital Output: Data output that must be interpreted digitally.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. An instrumentation list for each controlled system. Label each element of the controlled system in table format. Show, in the table element name, type of device, manufacturer, model number, and control device product data sheet number.
2. A complete description of the operation of the control system, including sequences of operation. Include and reference a schematic diagram of the controlled system.

B. Shop Drawings:

1. Riser diagrams showing control network layout, communication protocol, and wire types.

2. Schematic diagram of each controlled system. Include all control points labeled with point names shown or listed. Show the location of control elements in the system.
3. Wiring diagram for each controlled system. Show all control elements labels. Where a control element is the same as that shown on the control system schematic, label with the same name. Label all terminals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 HEATING CONTROL SEQUENCES

A. The following sequences must be used as the basis for operations. The contractor must provide detailed and specific sequences.

B. Boiler Control

1. Boilers must be controlled by the plant controller provided with the boilers. This contractor must provide an interface to the boiler and any required field wiring. Refer to section 235216 for additional information.
2. Boiler staging and temperature control must be provided by the boiler master control panel.

C. Control Circulating Pump(s):

1. Input Device:

a. Device: air-temperature sensor with air-temperature RTD transmitter.
b. Location: Outdoor-air.
c. Transference: Direct Digital Control controller.

2. Output Device:

a. Device: Command to electric relay.
b. Location: Motor controller.
c. Transference: Starter relay.

3. Action:

a. Energize pump(s) at outdoor-air temperatures below 65 deg F.
b. Enable additional circulating pump(s) , heating-water supply temperature control and , heating-water supply temperature reset control sequences.

D. Additional Circulating Pump(s):

1. Input Device:

a. Device: Liquid pressure differential transmitter.
b. Location: Between the primary supply and return piping.

c. Transference: Direct Digital Control controller.

2. Output Device:

a. Device: Binary output.
b. Location: Motor controller.
c. Transference: Starter relay.

3. Action:

a. Energize pump(s) and maintain operation when differential pressure drops below 30 percent of specified pump head.

E. Circulating Pump(s) Failure Alarm:

1. Input Device:

a. Device: Liquid pressure differential switch.
b. Location: Between the primary supply and return piping.
c. Transference: Direct Digital Control controller.

2. Output Device:

a. Device: Direct Digital Control controller.
b. Transference: Operator's workstation.

3. Action:

a. Signal alarm condition, no pressure differential between supply and return piping.
b. Location: Software.

F. Control Circulating Pump(s) Speed:

1. Input Device:

a. Device: Liquid pressure differential transmitter.
b. Location: Heating supply and return piping.
c. Transference: Direct Digital Control controller.

2. Output Device:

a. Device: Analog command.
b. Location: Motor controller.
c. Transference: Variable-frequency motor controller.

3. Action:

a. Control pump speed to maintain pressure differential of TBD psig..

G. Heating-Water Supply Temperature Reset:

1. Input:

    a. Device: Liquid temperature sensor with liquid temperature transmitter.
    b. Location: Outdoor-air and heating-water supply.
    c. Transference: Direct Digital Control controller.

2. Output:

    a. Device: Direct Digital Control controller to boiler controls.
    b. Location: Local panel.
    c. Transference: Boiler control panel.

3. Action:

    a. Reset heating-water supply temperature in straight-line relationship with outdoor-air temperature for the following conditions:

        1) 180 deg F (82 deg C) heating water when outdoor-air temperature is 32 deg F (0 deg C).
        2) 130 deg F heating water when outdoor-air temperature is 65 deg F (18 deg C).
        3) 130 deg F (54 deg C) minimum heating-water temperature.

H. Indicate the following on the operator's workstation display terminal:

1. Direct Digital Control system graphic.
2. Direct Digital Control system status, on-off.
3. Outdoor-air temperature.
4. Circulating pump(s) on-off status (enabled or disabled).
5. Circulating pump(s) on-off indication (operating or not operating).
6. Additional circulating pump(s) pressure differential.
7. Additional circulating pump(s) pressure differential set point.
8. Additional circulating pump(s) on-off indication (operating or not operating).
9. Circulating pump(s) alarm pressure differential.
10. Circulating pump(s) alarm pressure differential set point.
11. Alarm (circulating pump(s) failure).
12. Circulating pump(s) speed pressure differential.
13. Circulating pump(s) speed pressure differential set point.
14. Circulating pump(s) speed.
15. Heating-water supply temperature.
16. Heating-water return temperature.

17. Heating-water supply temperature set point.
18. Boiler master controller:

    a. On/off control
    b. On/off status
    c. Common trouble alarm
    d. Low water level alarm
    e. Hot water supply temperature setpoint adjustment

1.8 TERMINAL UNIT OPERATING SEQUENCE

A. Variable-Air-Volume Terminal Air Units with Hydronic Coils:

1. Occupancy:

a. Input:

1) Device: Time schedule.
2) Location: N/A.
3) Transference: Direct Digital Control controller.

b. Device: Direct Digital Control controller.
c. Action: Report occupancy and enable occupied temperature set point.

1) Occupied Cooling Temperature: 75 deg F.
2) Occupied Heating Temperature: 70 deg F.
3) Unoccupied Cooling Temperature: 85 deg F.
4) Unoccupied Heating Temperature: 65 deg F.

2. Space Temperature:

a. Input:

1) Device: transmitter.
2) Location: Space.
3) Transference: Direct Digital Control controller.

b. Output:

1) Device: Analog output.
2) Location: Control damper and valve actuators.
3) Input Transference: Control damper and valves.

c. Action: Modulate damper and valve to maintain the following space temperature set points:

1) Occupied Cooling Temperature: 75 deg F.
2) Occupied Heating Temperature: 70 deg F.
3) Unoccupied Cooling Temperature: 85 deg F.
4) Unoccupied Heating Temperature: 65 deg F.
5) Modulate damper actuator from full open to minimum position.
6) When damper is at minimum position, modulate reheat coil valve and perimeter fintube from closed to open.
7) If occupied space temperature is not maintained with valve open, modulate damper actuator from minimum position to 100 percent open.
8) Reverse the sequence for full heating to full cooling.

B. Fan Powered Variable-Air-Volume Terminal Air Units with Hydronic Coils:

1. Occupancy:

    a. Input:

        1) Device: Time schedule.
        2) Location: N/A.
        3) Transference: Direct Digital Control controller.

    b. Device: Direct Digital Control controller.
    c. Action: Report occupancy, enable fan, and enable occupied temperature set point.

        1) Occupied Cooling Temperature: 75 deg F.
        2) Occupied Heating Temperature: 70 deg F.
        3) Unoccupied Cooling Temperature: 85 deg F.
        4) Unoccupied Heating Temperature: 65 deg F.

2. Space Temperature:

    a. Input:

        1) Device: transmitter.
        2) Location: Space.
        3) Transference: Direct Digital Control controller.

    b. Output:

        1) Device: Analog output.
        2) Location: Control damper and valve actuators.
        3) Input Transference: Control damper and valves.

    c. Action: Modulate damper and valve to maintain the following space temperature set points:

        1) Occupied Cooling Temperature: 75 deg F.
        2) Occupied Heating Temperature: 70 deg F.
        3) Unoccupied Cooling Temperature: 85 deg F.
        4) Unoccupied Heating Temperature: 65 deg F.
        5) Modulate damper actuator from full open to minimum position.
        6) When damper is at minimum position, modulate reheat coil valve and perimeter fintube from closed to open.
        7) If occupied space temperature is not maintained with valve open, modulate damper actuator from minimum position to 100 percent open.
        8) Reverse the sequence for full heating to full cooling.

3. Life Safety Shutdown

a. Subcontractor must be responsible for providing interposing relays for terminal unit shutdown controls. A relay must be provided for each terminal unit. Relays must be mounted in an enclosure. Any additional interposing relays to properly sequence terminal units during this mode, must be provided by this Section. Wiring between the relays and the variable frequency drives and wiring between the relays and the dampers must be furnished and installed by this Subcontractor. Wiring between the relays and the fire alarm system and software programming of the fire alarm system must be furnished. The fire alarm system must provide the following relays:

1) Override relay (each unit).

C. Indicate the following on the operator's workstation display terminal:

1. Direct Digital Control system graphic.
2. Direct Digital Control system on-off indication (operating or not operating).
3. Direct Digital Control system occupied/unoccupied mode.
4. Outdoor-air-temperature indication.
5. Cabinet Unit Heater, Hydronic:

a. Space temperature indication.
b. Space temperature set point.
c. Fan on.

6. Unit Heater, Hydronic:

a. Space temperature indication.
b. Space temperature set point.
c. Fan on.

7. Constant-Volume, Terminal Air Units, Hydronic:

a. Space/area served.
b. Space occupied/unoccupied.
c. Space temperature indication.
d. Space temperature set point, occupied.
e. Space temperature set point, unoccupied.
f. Control-valve position as percentage open.

8. Variable-Air-Volume Terminal Air Units with Hydronic Coils:

a. Space/area served.
b. Space occupied/unoccupied.
c. Space temperature indication.
d. Space temperature set point.
e. Space cooling and heating temperature set point, occupied.
f. Space cooling and heating temperature set point, unoccupied.
g. Air-damper position as percentage open.
h. Control-valve position as percentage open.

9. Fan Powered Variable-Air-Volume Terminal Air Units with Hydronic Coils:

    a. Space/area served.
    b. Fan status.
    c. Space occupied/unoccupied.
    d. Space temperature indication.
    e. Space temperature set point.
    f. Space cooling and heating temperature set point, occupied.
    g. Space cooling and heating temperature set point, unoccupied.
    h. Air-damper position as percentage open.
    i. Control-valve position as percentage open.

10. Sequence Control:

    a. Space/area served.
    b. Space occupied/unoccupied.
    c. Space temperature indication.
    d. Space temperature set point, occupied.
    e. Space temperature set point, unoccupied.
    f. Damper position as percentage open.
    g. Control-valve positions as percentage open.

1.9 VENTILATION SEQUENCES

A. Exhaust Fan (Typical of Toilet Exhaust and General Exhaust) .

1. Input:

    a. Device: N/A .
    b. Location: N/A.

2. Output:

    a. Device: N/A.
    b. Location: N/A.
    c. Transference: N/A.

3. Action: Fan operates continuously. .

B. Transfer Fan: Room thermostat.

1. Input:

    a. Device: Temperature sensor.
    b. Location: Space.

2. Output:

a. Device: Hard wired.
b. Location: Motor controller.
c. Transference: Starter relay.

3. Action: Cycle fan on when space temperature rises above set point.

1.10 Air Handling Unit (AHU-R-1)

A. Unit must be provided with factory mounted controls.

B. This contractor must provide field installation and wiring for all required devices.

C. This contractor must provide a BACnet communication interface to the unit to facilitate start/stop control, and setpoint adjustment. All available points must be included in the communication interface.

1. Life Safety Shutdown and Post-Fire Smoke Purge Mode
   a. The supply fan must be capable of being shutdown by the fire alarm system.
   b. The return/spill fan must be capable of being shutdown and started by the fire alarm system.
   c. Electrical subcontractor shall provide interposing relays for fan and damper controls. Relays must be mounted in a location near the respective fans. Relays must be mounted in an enclosure. Wiring between the relay and the variable frequency drives must be furnished and installed by this Subcontractor. Wiring between the relays and the fire alarm system and software programming of the fire alarm system must be furnished by the Electrical subcontractor. The fire alarm system must provide the following relays:

      1) Stop relay (each supply and exhaust fan).

      2) Start relay (each exhaust fan).

      3) Run status relay (each supply and exhaust fan).

1.11 Life Safety and Post-Fire Purge System

1. A complete smoke control system must be provided for all air handling units in the building interfaced with the automatic sprinkler system and manual fire alarm system.
2. Air handling units that are included in the building are as follows:
   a. Air handling unit AHU-R-1, and associated return/spill fan
   b. Miscellaneous exhaust fans, toilet exhaust fans, and transfer fans.
   c. Electrically operated automatic smoke dampers (automatic louver dampers) are installed at the return air connection to each supply air system, in the fan discharge from each supply system, and at each point of supply and return air connection to each floor level. This Subcontractor must furnish and install all power and control wiring for each combination fire/smoke damper actuator.
3. During normal or post-fire purge operation, whenever the air fans are shut down, the dampers associated with their respective air fans must automatically close.
4. Activation of a return air smoke detector, area detector or Elevator Lobby smoke detector must automatically cause the following sequence of events to take place:
   a. An alarm signal must be transmitted to the Direct Digital Control System operator workstation.

b. Air handling units and return/spill fans, including general exhaust fans serving the area of alarm, must shut down if the systems are running. The dampers associated with these systems must close. Fan shutdown addressable relays functions must be furnished and installed per the Electrical specifications.
c. Air handling units and return/spill fans, including general exhaust fans serving areas other than the area of alarm, must continue to operate. Their respective dampers must remain open.

5. Activation of a water flow switch must automatically cause the following sequence of events to take place:
   a. An alarm signal must be transmitted to the Direct Digital Control System operator workstation.
   b. All air handling units and return/spill fans, including general exhaust fans serving the floor of alarm, must shut down if the systems are running. The dampers associated with these systems must close. Fan shutdown addressable relay functions must be furnished and installed per the Div. 26 Electrical specifications.
6. Activation of smoke detectors in any of the supply air systems, located downstream of the filters, must automatically cause the following sequence of events to occur:
   a. The affected supply air system must stop, and its respective dampers must automatically close.
   b. Alarm signal must be transmitted to the Direct Digital Control System and operator workstation.
   c. Fan shutdown addressable relays must be furnished and installed per the Div. 26 Electrical Specifications.

7. Activation of an Elevator Machine Room and/or hoistway second (cross-zoned) area smoke detector must automatically cause the following sequence of events to occur.
   a. Alarm signal must be transmitted to the Direct Digital Control System and operator workstation.
   b. The respective air conditioning unit serving the Elevator Machine Room must stop. The hoistway damper must open.
   c. Fan shutdown addressable relays must be furnished and installed per the Div. 26 Electrical Specifications.
8. Activation of a top of stair or vent smoke detector must automatically cause the following sequence of events to occur.
   a. Alarm signal must be transmitted to the Direct Digital Control System and operator workstation.
   b. The respective vent or top of stair damper must open.
   c. Damper addressable relays must be furnished and installed per the Div. 26 Electrical Specifications.
9. Activation of a duct smoke detector serving a combination fire/smoke damper must automatically cause the following sequence of events to occur:
   a. The affected combination fire/smoke damper must close. Note: If a fan is started from the fan and damper control panel to operate as a post-fire purge fan, the fire alarm system must be programmed to prevent any associated damper from closing due to activation of its duct mounted smoke detector.
   b. The affected supply air system must stop, and its respective dampers must automatically close.
   c. Alarm signal must be transmitted to the Direct Digital Control System and operator workstation.
   d. Fan shutdown addressable relays and damper “close " relays must be furnished and installed per the Div. 26 Electrical Specifications.
10. Activation of an area detector located at a stair entrance door must automatically cause the following sequence of events to take place:

a. The stair pressurization fans must start. Fan start addressable relays functions must be furnished and installed per the Div. 26 Electrical Specifications.

11. Supply air systems that have been stopped due to activation of the smoke detectors within the system downstream of filters cannot be restarted unless the smoke detector(s) in the fan discharge have been cleared and can be manually reset.
12. The Direct Digital Control subcontractor must be responsible for the interwiring between the life safety data gathering panel and the Direct Digital Control System. Panel location must be coordinated with the Fire Alarm Contractor. A UL listed communications interface must be provided between the Direct Digital Control System and the fire alarm system to receive the following alarms:
    a. One (1) common return air smoke detector/area smoke detector/ second (cross-zoned) elevator Lobby smoke detector per floor.
    b. One (1) water flow switch alarm per floor.
    c. Each supply air duct smoke detector (each supply fan system).
    d. One (1) common duct smoke detector serving combination fire/smoke dampers.
    e. Elevator Machine Room and/or hoistway second (cross-zoned) area smoke detector per Machine Room.
    f. Each stair vent and shaft vent alarm.
    g. Floor damper override position switch (each floor).
        1) Auto.
        2) Exhaust.
13. The Electrical subcontractor must be responsible for providing the fan and damper control panel and all required control functions detailed hereafter. Any additional wiring, appurtenances or devices required to provide the Code mandated by the 2014 New York City Construction Codes or specified system must be furnished per the Div. 26 Electrical Specifications.
14. The fan and damper control panel must have lights to monitor the status of fans and dampers and selector switches for manual override of the fan and damper controls. The panel must have a door provided with key lock flush handle and Plexiglas window, permitting the lights and switches to be seen, but not tampered with. All control in the firemen override mode must be from this panel only. Switches and lights must be mounted on the panel door. Fans within the building must be shown on the fan and damper control panel. A clear indication of the direction of airflow and the relationship of components must be displayed.
15. There must be a three-position switch, labeled “Off-Auto-On”, for each return/spill fan, Placing a switch in the “Off” position must stop a fan. Placing the switch in the “Auto” position passes control to the Direct Digital Control System, allowing it to be controlled in the normal operating mode. Placing the switch in the “On" position must start the fan. Return fan discharge dampers and intake dampers must open, and the main return air damper to the supply system must close.
16. For each floor there must be a three-position selector switch labeled “Auto-Exhaust ". Placing either selector switch in the “Auto" position must pass control of the respective fan and dampers to the Direct Digital Control System, allowing them to be controlled in a normal operating mode. Placing the selector switch in the “Exhaust" position must cause all the return combination fire/smoke dampers serving the selected floor to open. The return/spill fan serving the selected floor must be simultaneously placed in the “on position and must operate at full speed via a dedicated fire override signal originating at the fire alarm system.
17. There must be one (1) damper selector switch per stair vent damper, hoistway vent damper and roof hatch. Placing the switch in the “Close” position must close the damper or hatch. Placing the switch in “Auto” position passes control of the damper or hatch to the fire alarm system, allowing it to be controlled in a normal operating mode. Placing the switch in the “Open” position must open the damper or hatch.

18. When a floor or area is placed in “Exhaust mode, a software function of the fire alarm system must disable the automatic closure of a combination fire/smoke damper whose respective duct-mounted smoke detector is in alarm. For floors or areas that are not operating in “exhaust mode, the interlock between duct-mounted smoke detector and its respective combination fire/smoke damper must remain in operation.
19. The panel must contain four (4) indicating lights per fan, four (4) indicating lights per damper serving the respective fan, four (4) indicating lights per stair vent damper, hoistway vent damper and roof hatch, four (4) indicating lights per floor for the floor’s spill/smoke exhaust damper group and four (4) indicating lights per floor for the floor’s supply damper group.
20. A light “push-to-test switch must be installed on each panel face. The switch must be momentary. When the switch is energized, all indicating lights must be energized. The switch must be used to test the indicating lights.
21. Indicating lights must be as follows:
    a. Fans, dampers and other operating equipment in their normal status - White.
    b. Fans, dampers and other operating equipment in their off or closed status - Red.
    c. Fans, dampers and other operating equipment in their on or open status - Green.
    d. Fans, dampers and other operating equipment in a fault status - Yellow/Amber.
22. The total response time for individual components to achieve their desired state of operation mode (i.e., completion of damper travel or fan operation at the desired state) must be in accordance with NFPA 92A.
23. This subcontractor must furnish and install either a differential pressure switch or a current-sensing relay for each fan which is stopped and/or started via the fire alarm system and fan and damper panels. Differential pressure switches must be utilized for stair pressurization fans. Current-sensing relays must be utilized for all other fans. Switches must be utilized for fan run status monitoring at the fire alarm system. Wiring between the switches and addressable input relay modules furnished with the fire alarm system must be furnished by this Contractor. Solenoid valve must remain open until a leak is detected.

1.12 Meters and Gauges for Plumbing Piping

A. The Direct Digital Control subcontracotr must provide all required power and control wiring for Meters and Gauges for Plumbing Piping control panels and devices as described in Section 220519 of the specifications and as shown on the associated Contract Drawings.

    1. Domestic service utility water meters: This subcontractor must wire the BMS to second set of contacts on meter register for trending and data collection (where utility meters readout in cubic feet convert to gpm through BMS - consumption).

B. General-Duty Valves for Plumbing Piping: This subcontractor must provide all required power and control wiring to interconnect pressure switches to each other and pressure switches, leak detection and safety solenoids to BMS system as described in Sections 220523.12, 220523.13, 220523.14, and 220523.15 of the specifications and as shown on the associated Contract Drawings.

    1. General Valves

        a. The contractor to provide the following control and power wiring deviices.

            1) Leak detection alarm for hot water heaters with or without a drip pan.

2) Domestic water solenoid safety shutoff valve for cold water feed to hot water heater when leak is detected (solenoid valve must remain open until a leak is detected)

2. Rainwater/Stormwater/Greywater Storage Tanks

a. The contractor shall provide the following control and power wiring to monitor the following points.

1) Low water level alarm
2) Low-low water level alarm
3) High water level alarm
4) High-high water level alarm
5) Actual water level
6) Open access door alarm for each water tank of for each compartment of a multi-compartment water tank.

3. Sanitary Sewerage Pumps: This subcontracotr must provide all required power and control wiring as described in Section 221329 and as shown on the associated Contract Drawings.

a. Ejector Pumps (for each set of ejectors or per pit)

1) This subcontractor must provide the following control and power to monitor the following points.

a) High water alarm for each ejector pit.
b) High-high water alarm (back-up float) for each ejector pit
c) common trouble alarm

b. Elevator Sump Pumps (for each pump)

1) This subcontractor must provide the following control and power to monitor the following points.

a) High water alarm for each elevator sump pit.
b) Pump failed alarm
c) Oil present for each elevator sump pump. (make sure oil minder is specified with oil sensor.)

4. Electric Domestic Water Heaters. This subcontractor must provide all required power and control wiring as described in Section 223300 "Electric, Domestic-water Heaters" of the specifications and as shown on the associated Contract Drawings

a. Electric Storagte Type Water Heaters

1) This subcontractor must provide the following control and power to monitor the following points:

a) Leak detector: Leak detector to be provided by BMS subcomtractor.

b) Solenoid safety shutoff valve for cold water feed to ot water heater when leak is detected (solenoid valve must remain open until a leak is detected)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230993.11

SECTION 231123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Joining materials.
3. Manual gas shutoff valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. An example includes rooftop locations.

C. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

D. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Piping specialties.
2. Corrugated, stainless steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Pressure regulators. Indicate pressure ratings and capacities.
5. Service meters. Indicate pressure ratings and capacities. Include bypass fittings and meter bars.

6. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1. Shop Drawing Scale: 1/4 inch per foot.
2. Detail mounting, supports, and valve arrangements for service-meter assembly and pressure regulator assembly.

C. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

1.6 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Welding certificates.

B. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

D. Qualification Statements: For professional engineer licensed in the State of New York.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For motorized gas valves pressure regulators and service meters to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Qualifications:

1. Steel Support Welding: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. Pipe Welding: Qualify procedures and operators in accordance with the ASME Boiler and Pressure Vessel Code.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping in accordance with requirements of the 2014 NYC Building Codes.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.

1.10 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by City of New York or others unless permitted under the following conditions, and then only after arranging to provide purging and startup of natural-gas supply in accordance with requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Commissioner's written permission.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate requirements for access panels and doors for valves installed and concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

C. Coordinate requirements for piping identification for natural-gas piping.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each product type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 54.

B. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.
3. Minimum Operating Pressure of Service Meter: 5 psig.

C. Natural-Gas System Pressure within Buildings:

1. Single Pressure: More than 2 psig, but not more than 5 psig.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.

1. Wrought-Steel Welding Fittings: ASTM A234/A234M for butt welding and socket welding.

2.4 JOINING MATERIALS

A. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.5 MANUAL GAS SHUTOFF VALVES

A. See "Underground, Manual Gas Shutoff Valve Schedule" and "Aboveground, Manual Gas Shutoff Valve Schedule" articles for where each valve type is applied in various services.

B. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. A.Y. McDonald Mfg. Co.

b. Apollo Valves; a part of Aalberts Integrated Piping Systems.
c. BrassCraft Manufacturing Co.; a Masco company.
d. Or approved equal.

2. Body: Bronze, complying with ASTM B584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground, Manual Gas Shutoff Valve Schedule" and "Aboveground, Manual Gas Shutoff Valve Schedule" articles.
8. CWP Rating: 600 psig.

9. Listing: Valves NPS 1 and smaller are to be listed and labeled by an NRTL.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.6 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description and rated pressure of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

B. Label and identify gas piping and pressure outside a multitenant building by tenant.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping in accordance with NFPA 54 to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 requirements for preventing accidental ignition.

3.4 INSTALLATION OF OUTDOOR PIPING

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in "Section 315000 - Excavation Support and Protection" for excavating, trenching, and backfilling.

1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.

C. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

D. Copper Tubing with Protective Coating:

1. Apply joint cover kits over tubing to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.

E. Install fittings for changes in direction and branch connections.

F. Install pressure gauge upstream and downstream from each service regulator. Pressure gauges are specified in Section 230519 "Meters and Gauges for HVAC Piping."

3.5 INSTALLATION OF INDOOR PIPING

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Do not install piping in concealed locations unless sleeved with the sleeve open at both ends.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Where installing piping above accessible ceilings, allow sufficient space for ceiling panel removal.

G. Locate valves for easy access. Do not locate valves within return air plenums.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
2. Install sediment trap on both sides of regulators for gas reduction to 2 psig with valve and capped.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

P. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
2. In Floors: Install natural-gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
3. In Floor Channels: Install natural-gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.
4. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

    a. Exception: Tubing passing through partitions or walls does not require striker barriers.

5. Prohibited Locations:

    a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    b. Do not install natural-gas piping in solid walls or partitions.

Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

R. Connect branch piping from top or side of horizontal piping.

S. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

T. Do not use natural-gas piping as grounding electrode.

U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

V. Install pressure gauge upstream and downstream from each line regulator. Pressure gauges are specified in Section 230519 "Meters and Gages for HVAC Piping."

W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

3.6 INSTALLATION OF SERVICE-METER ASSEMBLIES

A. Install service-meter assemblies aboveground, on concrete bases.

B. Install metal shutoff valves upstream from service regulators. Shutoff valves are not required at second regulators if two regulators are installed in series.

C. Install strainer on inlet of service-pressure regulator and meter set.

D. Install service regulators mounted outside with vent outlet horizontal or facing down. Install screen in vent outlet if not integral with service regulator.

E. Install metal shutoff valves upstream from service meters. Install dielectric fittings downstream from service meters.

F. Install service meters downstream from pressure regulators.

G. Install metal bollards to protect meter assemblies. Comply with requirements in Section 055000 "Metal Fabrications" for pipe bollards.

3.7 INSTALLATION OF VALVES

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install earthquake valves aboveground outside buildings according to listing.

E. Install anode for metallic valves in underground PE piping.

F. Do not install valves in return-air plenums.

3.8 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints in accordance with AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints in accordance with AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, and then use wrench. Do not overtighten.

H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join in accordance with ASTM D2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.9 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

B. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

C. Install hangers for steel piping and copper tubing, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58 and the requirements of the 2014 NYC Building Code, whichever are most stringent.

D. Install hangers for corrugated stainless steel tubing, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions and the requirements of the 2014 NYC Building Code, whichever are most stringent.

E. Support horizontal piping within 12 inches of each fitting.

F. Support vertical runs of steel piping and copper tubing to comply with MSS SP-58 and the requirements of the 2014 NYC Building Code, whichever are most stringent.

G. Support vertical runs of corrugated stainless steel tubing to comply with manufacturer's written instructions and the requirements of the 2014 NYC Building Code, whichever are most stringent.

3.10 PIPING CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas-appliance equipment grounding conductor of the circuit powering the appliance in accordance with NFPA 70.

C. Where installing piping adjacent to appliances, allow space for service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

3.11 LABELING AND IDENTIFICATION

A. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for piping and valve identification.

B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Use 3000 psig, 28-day, compressive-strength concrete and reinforcement as specified in Section 033000 "Cast-in-Place Concrete."

3.13 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate earthquake valves.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 5 PSIG

A. Aboveground, branch piping NPS 1 and smaller is to be one of the following:

1. Annealed-temper, tin-lined copper tube with flared joints and fittings.
2. Annealed-temper copper tube with wrought-copper fittings and brazed joints.
3. Aluminum tube with flared fittings and joints.
4. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping is to be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with steel welding fittings and welded joints.
3. Drawn-temper copper tube with wrought-copper fittings and brazed joints.

3.15 ABOVEGROUND, MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 and smaller at service meter are to be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full -port, bronze ball valves with bronze trim.

B. Valves for pipe sizes NPS 2-1/2 and larger at service meter are to be one of the following:

1. Two-piece, full -port, bronze ball valves with bronze trim.

C. Distribution piping valves for pipe sizes NPS 2 and smaller are to be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full -port, bronze ball valves with bronze trim.

D. Distribution piping valves for pipe sizes NPS 2-1/2 and larger are to be one of the following:

1. Two-piece, full -port, bronze ball valves with bronze trim.

END OF SECTION 231123

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Steel pipe and fittings.
3. Stainless steel pipe and fittings.
4. Plastic pipe and fittings.
5. Piping joining materials.
6. Transition fittings.
7. Dielectric fittings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Pipe and tube.
2. Fittings.
3. Joining materials.
4. Transition fittings.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Environmental Product Declaration: For each product.
4. Health Product Declaration: For each product.
5. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Engineering services Submittals:

1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
2. Locations of pipe anchors, alignment guides, and expansion joints and loops.
3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.
4. Locations of and details for penetration and firestopping for fire- and smoke-rated wall and floor and ceiling assemblies.

D. Coordination Drawings: Piping layout, or BIM model, drawn to scale, indicating the items described in this Section, and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications:

1. Installers of Pressure-Sealed Joints: Installers are to be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
2. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP are to be certified by manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.

C. Steel Support Welding: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

D. Pipe Welding: Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code: Section IX.

1. Comply with ASME B31.9 for materials, products, and installation.
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation are to be capable of withstanding the following minimum working pressures and temperatures unless otherwise indicated:

1. Hot-Water Heating Piping: 100 psig at 180 deg F.
2. Condensate-Drain Piping: 150 deg F.
3. Air-Vent Piping: 180 deg F.
4. Pressure-Relief-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tube: and.

B. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Do not use solder joints on pipe sizes greater than NPS 4.

C. Wrought-Copper Unions: ASME B16.22. Do not use solder joints on pipe sizes greater than NPS 4.

2.3 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A53/A53M black steel with plain ends; welded and seamless, Grade B, and schedule number as indicated in Part 3,"Piping Applications" Article.

B. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in Part 3, "Piping Applications" Article.

C. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3, "Piping Applications" Article.

D. Wrought-Steel Fittings: ASTM A234/A234M; wall thickness to match adjoining pipe.

E. Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

F. Steel Pipe Nipples: ASTM A733, made of same materials and wall thicknesses as pipe in which they are installed.

2.4 STAINLESS STEEL PIPE AND FITTINGS

A. Stainless Steel Pipe, Plain Ends: ASTM A312/A312M plain ends, seamless; stainless steel of types and schedules as indicated in Part 3 "Piping Applications" Article.

2.5 PLASTIC PIPE AND FITTINGS

A. CPVC Plastic Pipe: ASTM F441/F441M, with wall thickness as indicated in "Piping Applications" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Charlotte Pipe and Foundry Company.
    b. IPEX USA LLC.
    c. Spears Manufacturing Company.
    d. Or approved equal.

2. Source Limitations: Obtain CPVC plastic pipe from single manufacturer.
3. CPVC Socket Fittings: ASTM F438 for Schedule 40 .
4. CPVC Threaded Fittings: ASTM F437, Schedule 80.
5. CPVC Piping System: ASTM D2846/D2846M, SDR, pipe and socket fittings.
6. CPVC Tubing System: ASTM D2846/D2846M, SDR, tube and socket fittings.

B. Smoke and Fire Ratings:

1. Where indicated on Drawings that a plenum-rated piping system is required, the pipe is to be wrapped and/or insulated with fiberglass or mineral wool pipe insulation; field installed.

    a. The system is to have a flame-spread classification of less than 25 and smoke-developed rating of less than 50.
    b. Pipe, wrap, or insulation as a system to comply with the requirements of CAN/ULC-S102.2, ASTM E84, or UL 2846.
    c. For insulation required for thermal and condensation conditions, see Section 230719 "HVAC Piping Insulation."

2.6 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.

    a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

D. Solder Filler Metals: ASTM B32, lead-free alloys.

E. Flux: ASTM B813, water flushable.

F. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

G. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for CPVC Piping: ASTM F493.

1. Solvent cement must have a VOC content of 490 g/L or less.
2. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.7 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

2.8 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. A.Y. McDonald Mfg. Co.
b. Capitol Manufacturing Company.
c. GF Piping Systems: Georg Fischer LLC.
d. HART Industrial Unions, LLC.
e. Jomar Valve.
f. Matco-Norca.
g. WATTS.
h. Wilkins.
i. Zurn Industries, LLC.
j. Or approved equal.

2. Source Limitations: Obtain dielectric unions from single manufacturer.
3. Description:

a. Standard: ASSE 1079.
b. Pressure Rating: 150 psig .
c. End Connections: Solder-joint copper alloy and threaded ferrous. Solder joints are not to be used on pipe sizes greater than NPS 4.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GF Piping Systems: Georg Fischer LLC.
b. WATTS.
c. Wilkins.
d. Zurn Industries, LLC.
e. Or approved equal.

2. Source Limitations: Obtain dielectric flanges from single manufacturer.
3. Description:

a. Standard: ASSE 1079.
b. Factory-fabricated, bolted, companion-flange assembly.
c. Pressure Rating: 150 psig .
d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advance Products & Systems, LLC.
b. Calpico, Inc.
c. GF Piping Systems: Georg Fischer LLC.
d. GPT; a division of EnPRO Industries.
e. Or approved equal.

2. Source Limitations: Obtain dielectric-flange insulating kits from single manufacturer.
3. Description:

a. Nonconducting materials for field assembly of companion flanges.
b. Pressure Rating: 150 psig.
c. Gasket: Neoprene or phenolic.
d. Bolt Sleeves: Phenolic or polyethylene.
e. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International/Smith-Cooper International; Tailwind Capital, LLC.
b. Elster Perfection; a Honeywell Company.
c. GPT; a division of EnPRO Industries.
d. Matco-Norca.
e. Precision Plumbing Products.
f. Sioux Chief Manufacturing Company, Inc.
g. Victaulic Company.
h. Or approved equal.

2. Source Limitations: Obtain dielectric nipples from single manufacturer.
3. Description:

a. Standard: IAPMO PS 66.
b. Electroplated steel nipple, complying with ASTM F1545.
c. Pressure Rating: Minimum 300 psig at 225 deg F.
d. End Connections: Male threaded or grooved.
e. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PIPING APPLICATIONS

A. Hot-Water Heating Piping, Aboveground, NPS 2 and Smaller, to Be Any of the Following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Schedule 40, Grade B, steel pipe; Class 150, malleable-iron fittings; and threaded joints.
3. Schedule 5, Type 304, stainless steel pipe; Type 316, stainless steel pressure-seal fittings; and pressure-seal joints.
4. Schedule 10, Type 304, stainless steel pipe; Type 304, grooved mechanical joint coupling and fittings; and grooved mechanical joints.
5. Schedule 40, CPVC plastic pipe and fittings and solvent-welded joints.
6. RTRP and RTRF with adhesive joints.

B. Hot-Water Heating Piping, Aboveground, NPS 2-1/2 and Larger, to Be Any of the Following:

1. Type L drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Schedule 40, Grade B, steel pipe; Class 150, malleable-iron fittings; welded joints, cast-iron flanges, flange-fittings, and flanged joints.
3. Schedule 40, Grade B, steel pipe; grooved mechanical joint coupling and fittings; and grooved mechanical joints.
4. Schedule 40, Grade B, steel pipe, plain-end mechanical joint couplings and fittings; and plain-end mechanical joints.
5. Schedule 10, Type 304, stainless steel pipe; Type 304, grooved mechanical joint coupling and fittings; and grooved mechanical joints.
6. Schedule 40, CPVC plastic pipe and fittings and solvent-welded joints.
7. RTRP and RTRF with adhesive or flanged joints.

C. Condensate-Drain Piping Installed Aboveground to Be Any of the Following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Schedule 40, PVC plastic pipe and fittings and solvent-welded joints.
3. Schedule 5, Type 304, stainless steel pipe; Type 316, stainless steel pressure-seal couplings and fittings; and pressure-seal joints.

D. Air-Vent Piping:

1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems, according to piping manufacturer's written instructions.
2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

E. Pressure-Relief-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed, with metal-to-plastic transition fittings for plastic piping systems, according to piping manufacturer's written instructions.

3.3 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

O. Install branch connections to mains using mechanically formed tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

P. Install valves according to the following:

1. Section 230523.12 "Ball Valves for HVAC Piping."
2. Section 230523.13 "Butterfly Valves for HVAC Piping."
3. Section 230523.14 "Check Valves for HVAC Piping."

Q. Install air vents and pressure-relief valves in accordance with Section 232116 "Hydronic Piping Specialties."

R. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

S. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

T. Install shutoff valve immediately upstream of each dielectric fitting.

U. Comply with requirements in Section 230516 "Expansion Fittings and Loops for HVAC Piping" for installation of expansion loops, expansion joints, anchors, and pipe alignment guides.

V. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for identifying piping.

W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints in accordance with ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.

D. Brazed Joints: Construct joints in accordance with AWS's "Brazing Handbook," "Pipe and Tube" chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints in accordance with AWS D10.12M/D10.12, using qualified processes and welding operators in accordance with "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join in accordance with ASTM D2846/D2846M Appendix.
3. PVC Pressure Piping: Join ASTM D1785 schedule number, PVC pipe, and PVC socket fittings in accordance with ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings in accordance with ASTM D2855.
4. PVC Nonpressure Piping: Join in accordance with ASTM D2855.

I. Fiberglass-Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

J. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.

K. Plain-End Mechanical-Coupled Joints: Prepare, assemble, and test joints in accordance with manufacturer's written installation instructions.

L. Mechanically Formed Tee Fittings: Use manufacturer-recommended tools, procedure, and brazed joints.

M. Pressure-Seal Joints: Use manufacturer-recommended tools and procedure. Leave insertion marks on pipe after assembly.

3.5 INSTALLATION OF DIELECTRIC FITTINGS

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges flange kits nipples.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Section 230548.13 "Vibration and Seismic Controls for HVAC."

B. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

C. Install hangers for copper tubing and steel piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58 and the requirements of the 2014 NYC Building Code, whichever are most stringent.

D. Install hangers for plastic piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions and the requirements of the 2014 NYC Building Code, whichever are most stringent.

E. Install hangers for fiberglass piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions and the requirements of the 2014 NYC Building Code, whichever are most stringent.

F. Support horizontal piping within 12 inches of each fitting and coupling.

G. Support vertical runs of copper tubing and steel piping to comply with MSS-58, and the requirements of the 2014 NYC Building Code, whichever are most stringent.

H. Support vertical runs of CPVC piping to comply with manufacturer's written instructions, and the requirements of the 2014 NYC Building Code, whichever are most stringent.

I. Support vertical runs of fiberglass piping to comply with manufacturer's written instructions, and the requirements of the 2014 NYC Building Code, whichever are most stringent.

3.7 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections are to be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gauges and thermometers at coil inlet and outlet connections. Comply with requirements in Section 230519 "Meters and Gauges for HVAC Piping."

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 230553 "Identification for HVAC Piping and Equipment."

3.9 SYSTEM STARTUP

A. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.

4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

3.10 FIELD QUALITY CONTROL

A. Prepare hydronic piping in accordance with ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure is to be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install pressure-relief valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient-temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure is not to exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9.
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

END OF SECTION 232113

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hydronic specialty valves.
2. Air vents.
3. Expansion tanks and fittings.
4. Air/dirt separators and purgers.
5. Strainers.
6. Flexible connectors.

B. Related Requirements:

1. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for expansion fittings and loops.
2. Section 230523.12 "Ball Valves for HVAC Piping" for specification and installation requirements for ball valves common to most piping systems.
3. Section 230523.13 "Butterfly Valves for HVAC Piping" for specification and installation requirements for butterfly valves common to most piping systems.
4. Section 230523.14 "Check Valves for HVAC Piping" for specification and installation requirements for check valves common to most piping systems.
5. Section 230923.11 "Control Valves" for automatic control valve and sensor specifications, installation requirements, and locations.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product:

1. Include construction details and material descriptions for hydronic piping specialties.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
3. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For hydronic piping specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Pipe Welding: Qualify procedures and operators in accordance with ASME BPVC, Section IX.

C. Pressure-relief and safety-relief valves and pressure vessels bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME BPVC, Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 HYDRONIC SPECIALTY VALVES

A. Bronze, Calibrated-Orifice, Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Armstrong Fluid Technology.
   c. Bell & Gossett; a Xylem brand.
   d. Hays Fluid Controls.
   e. IMI Flow Design, Inc.
   f. Jenkins Valves; a Crane Co. brand.
   g. Jomar Valve.
   h. Nexus Valve, Inc.
   i. NIBCO INC.
   j. Taco Comfort Solutions.
   k. Tour & Andersson; available through Victaulic Company.
   l. Victaulic Company.
   m. WATTS.
   n. Or approved equal.

2. Body: Bronze, ball or plug type with calibrated orifice or venturi.
3. Ball: Brass or stainless steel.
4. Plug: Resin.
5. Seat: PTFE.
6. End Connections: Threaded or socket.
7. Pressure Gauge Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.

B. Diaphragm-Operated, Pressure-Reducing Valves: ASME labeled.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Bell & Gossett; a Xylem brand.
    c. Jenkins Valves; a Crane Co. brand.
    d. NIBCO INC.
    e. Spence Engineering Company, Inc.
    f. Taco Comfort Solutions.
    g. Victaulic Company.
    h. WATTS.
    i. Zurn Industries, LLC.
    j. Or approved equal.

2. Body: Bronze or brass.
3. Disc: Brass .
4. Seat: Brass .
5. Stem Seals: EPDM O-rings.
6. Diaphragm: EPDM.
7. Low inlet-pressure check valve.
8. Inlet Strainer: brass, removable without system shutdown.
9. Valve Seat and Stem: Noncorrosive.
10. Valve Size and Capacity: As indicated on Drawings.
11. Operating Pressure: Factory set and field adjustable.

C. Diaphragm-Operated Pressure-Relief Valves: ASME labeled.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
    b. Bell & Gossett; a Xylem brand.
    c. WATTS.
    d. Zurn Industries, LLC.
    e. Or approved equal.

2. Body: Bronze or brass.
3. Disc: Brass .
4. Seat: Brass .
5. Stem Seals: EPDM O-rings.
6. Diaphragm: EPDM.
7. Valve Seat and Stem: Noncorrosive.
8. Valve Size, Capacity, and Operating Pressure: Comply with ASME BPVC, Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

D. Automatic Flow-Control Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
b. Bell & Gossett; a Xylem brand.
c. Griswold Controls.
d. Hays Fluid Controls.
e. IMI Flow Design, Inc.
f. Nexus Valve, Inc.
g. NIBCO INC.
h. Spence Engineering Company, Inc.
i. Victaulic Company.
j. WATTS.
k. Or approved equal.

2. Body: Brass or ferrous metal.
3. Combination Assemblies: Include bronze or brass-alloy ball valve.
4. Identification Tag: Marked with zone identification, valve number, and flow rate.
5. Size and Capacity: For each application, provide a valve with rated capacity equal to or greater than capacity of device being served.
6. Performance: Maintain constant flow within plus or minus 10 percent, regardless of system pressure fluctuations.
7. Minimum CWP Rating: 300 psig.
8. Maximum Operating Temperature: 200 deg F .

2.2 AIR VENTS

A. Manual Air Vents:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bell & Gossett; a Xylem brand.
b. HCI; Hydronics Components Inc.
c. Nexus Valve, Inc.
d. Taco Comfort Solutions.
e. WATTS.
f. Or approved equal.

2. Body: Bronze.
3. Internal Parts: Nonferrous.
4. Operator: Screwdriver or thumbscrew.
5. Inlet Connection: NPS 1/2.
6. Discharge Connection: NPS 1/8.
7. CWP Rating: 150 psig.
8. Maximum Operating Temperature: 225 deg F.

B. Automatic Air Vents:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bell & Gossett; a Xylem brand.

b. Flo Fab Inc.
c. Metraflex Company (The).
d. Nexus Valve, Inc.
e. NuTech Hydronic Specialty Products.
f. Spirotherm, Inc.
g. Taco Comfort Solutions.
h. WATTS.
i. Or approved equal.

2. Body: Bronze or cast iron.
3. Internal Parts: Nonferrous.
4. Operator: Noncorrosive metal float.
5. Inlet Connection: NPS 1/2.
6. Discharge Connection: NPS 1/4.
7. CWP Rating: 150 psig.
8. Maximum Operating Temperature: 240 deg F.

2.3 EXPANSION TANKS AND FITTINGS

A. Bladder-Type ASME Expansion Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AMTROL, Inc.
b. Armstrong Fluid Technology.
c. Bell & Gossett; a Xylem brand.
d. Taco Comfort Solutions.
e. WATTS.
f. Or approved equal.

2. Tank: Welded steel, rated for 125 psig working pressure and 375 deg F maximum operating temperature. Factory test after taps are fabricated and supports installed and are labeled in accordance with ASME BPVC, Section VIII, Division 1.
3. Bladder: Securely sealed into tank to separate air charge from system water to maintain required expansion capacity. Field-replaceable bladder.
4. Sight glass.
5. Air-Charge Fittings: Schrader valve, stainless steel with EPDM seats.

2.4 AIR/DIRT SEPARATORS AND PURGERS

A. In-Line Air Separators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AMTROL, Inc.
b. Armstrong Fluid Technology.
c. Bell & Gossett; a Xylem brand.
d. Spirotherm, Inc.

e. Taco Comfort Solutions.
f. WATTS.
g. Or approved equal.

2. Tank: One-piece cast iron with an integral weir constructed to decelerate system flow to maximize air separation.
3. Maximum Working Pressure: Up to 175 psig.
4. Maximum Operating Temperature: Up to 300 deg F.

B. Air Purgers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bell & Gossett; a Xylem brand.
b. Griswold Controls.
c. Spirotherm, Inc.
d. Taco Comfort Solutions.
e. WATTS.
f. Or approved equal.

2. Body: Cast iron with internal baffles that slow the water velocity to separate the air from solution and divert it to the vent for quick removal.
3. Maximum Working Pressure: 150 psig.
4. Maximum Operating Temperature: 250 deg F.

2.5 STRAINERS

A. Y-Pattern Strainers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flexicraft Industries.
b. Griswold Controls.
c. Hays Fluid Controls.
d. Metraflex Company (The).
e. Nexus Valve, Inc.
f. Titan Flow Control, Inc.
g. Victaulic Company.
h. WATTS.
i. Zurn Industries, LLC.
j. Or approved equal.

2. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
3. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
4. Strainer Screen: Stainless steel, 40 -mesh strainer, or perforated stainless steel basket.
5. CWP Rating: 125 psig.

B. Basket Strainers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Flexicraft Industries.
    b. Metraflex Company (The).
    c. WATTS.
    d. Zurn Industries, LLC.
    e. Or approved equal.

2. Body: ASTM A126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
3. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
4. Strainer Screen: 40 -mesh startup strainer and perforated stainless steel basket with 50 percent free area.
5. CWP Rating: 125 psig.

2.6 FLEXIBLE CONNECTORS

A. Stainless Steel Bellows, Flexible Connectors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Flexicraft Industries.
    b. Flo Fab Inc.
    c. Metraflex Company (The).
    d. Or approved equal.

2. Body: Stainless steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
3. End Connections: Threaded or flanged to match equipment connected.
4. Performance: Capable of 3/4-inch misalignment.
5. CWP Rating: 150 psig.
6. Maximum Operating Temperature: 250 deg F.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine all piping specialties for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Examine threads on all devices for form and cleanliness.

C. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

D. Do not attempt to repair defective piping specialties; replace with new devices. Remove defective piping specialties from site.

3.3 INSTALLATION OF VALVES

A. Install calibrated-orifice balancing valve at each branch connection to return main.

B. Install calibrated-orifice, balancing valve in the return pipe of each heating or cooling terminal.

C. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

D. Install pressure-relief and safety-relief valves at hot-water generators and elsewhere as required by ASME BPVC. Pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME BPVC, Section VIII, Division 1, for installation requirements.

3.4 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents at high points of system piping in mechanical equipment rooms only.

1. Provide air outlet drain line full size of air outlet to floor drain or to other point indicated on Drawings.

C. Install manual vents at heat-transfer coils and elsewhere as required for air venting.

D. Install in-line air separators in pump suction. Install drain valve on air separators NPS 2 and larger.

E. Install tangential air separator in pump suction. Install blowdown piping with gate or full-port ball valve full size of separator outlet; extend full size to nearest floor drain.

F. Install expansion tanks having direct air/water interface above the air separator or air purger. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.

1. Install tank fittings that are shipped loose.
2. Support tank from floor or structure above with sufficient strength to carry weight of tank, piping connections, and fittings, plus tank full of water. Do not overload building components and structural members.
3. Install piping from air separator or air purger to expansion tank with a 2 percent upward slope toward tank to avoid air entrapment.

G. Install diaphragm- or bladder-type expansion tanks on the floor.

H. Vent and purge air from hydronic system, and ensure that tank is properly charged with air to suit system Project requirements.

END OF SECTION 232116

SECTION 232123 - HYDRONIC PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Close-coupled, in-line centrifugal pumps.
2. Separately coupled, vertically mounted, in-line centrifugal pumps.
3. Automatic condensate pump units.

1.3 DEFINITIONS

A. ECM: Electronically commutated motor.

B. EPDM: Ethylene propylene diene monomer.

C. EPR: Ethylene propylene rubber.

D. FKM: Fluoroelastomer polymer.

E. HI: Hydraulic Institute.

F. NBR: Nitrile rubber or Buna-N.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of pump.

1. Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated.
2. Indicate pump's operating point on curves.

B. Shop Drawings: For each pump.

1. Show pump layout and connections.
2. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
3. Include diagrams for power, signal, and control wiring.

C. Engineering Services Submittal: For each pump.

1. Engineering calculations and vibration isolation base details, signed and sealed by a qualified professional engineer licensed in the State of New York.

a. Engineering Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
b. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

D. Coordination Drawings: Plans, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates for pumps, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Engineering services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design vibration isolation.

C. Seismic Performance: Pumps must withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
2. Component Importance Factor: 1.5.

2.2 CLOSE-COUPLED, IN-LINE CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong Pumps, Inc.
2. Aurora Pump; Pentair Ltd.
3. Crane Pumps & Systems.
4. Grundfos Pumps Corporation.
5. PACO Pumps; Grundfos Pumps Corporation, USA.
6. Peerless Pump Company.
7. TACO Comfort Solutions, Inc.
8. Or approved equal.

B. Source Limitations: Obtain pumps from single source from single manufacturer.

C. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally or vertically.

D. Pump Construction:

1. Casing: Radially split, cast iron, with threaded gauge tappings at inlet and outlet, replaceable bronze wear rings, and threaded companion-flange union-end connections.
2. Impeller: ASTM B584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For constant-speed pumps, trim impeller to match specified performance.
3. Pump Shaft Sleeve: Bronze .
4. Seal: Mechanical seal consisting of carbon rotating ring against a ceramic seat held by a stainless steel spring, and EPDM rubber bellows and gasket. Include water slinger on shaft between motor and seal.
5. Seal Flushing: Flush, cool, and lubricate pump seal by directing pump discharge water to flow over the seal.

E. Shaft Coupling: Rigid, axially-split spacer coupling to allow service of pump seal without disturbing pump or motor.

F. Motor: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Enclosure : Totally enclosed, fan cooled.

2. NEMA Premium Efficient motors as defined in NEMA MG 1.
3. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
4. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
5. Variable-speed motor.

2.3 SEPARATELY COUPLED, VERTICALLY MOUNTED, IN-LINE CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following::

1. Armstrong Pumps, Inc.
2. Aurora Pump; Pentair Ltd.
3. Flowserve Corporation.
4. PACO Pumps; Grundfos Pumps Corporation, USA.
5. Patterson Pump Company; a Gorman-Rupp company.
6. Peerless Pump Company.
7. TACO Comfort Solutions, Inc.
8. Thrush Co. Inc.
9. Or approved equal.

B. Source Limitations: Obtain pumps from single source from single manufacturer.

C. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted vertically.

D. Pump Construction:

1. Casing: Radially split, cast iron, with threaded gauge tappings at inlet and outlet, replaceable bronze wear rings, and threaded companion-flange union-end connections.
2. Impeller: ASTM B584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For pumps that are not frequency-drive controlled, trim impeller to match specified performance.
3. Pump Shaft: Type 304 stainless steel .
4. Seal: Mechanical seal consisting of carbon rotating ring against a ceramic seat held by a stainless steel spring, and EPDM bellows and gasket.

E. Shaft Coupling: Interlocking frame with interconnecting springs capable of absorbing vibration.

F. Motor: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Enclosure: Totally enclosed, fan cooled.
2. NEMA Premium Efficient motors as defined in NEMA MG 1.
3. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
4. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
5. Variable-speed motor.

6. Provide integral pump motor variable-speed controller.

2.4 AUTOMATIC CONDENSATE PUMP UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following::

1. Crane Pumps & Systems.
2. Hartell Pumps; Milton Roy.
3. Little Giant Pump Co.
4. Or approved equal.

B. Source Limitations: Obtain pump units from single source from single manufacturer.

C. Description: Packaged units with corrosion-resistant pump, aluminum tank with cover, and automatic controls. Collects and removes condensate from fan coil units, air handling units, condensing boilers, and similar components. Include factory- or field-installed check valve and 72-inch- minimum, electrical power cord with plug.

2.5 PUMP SPECIALTY FITTINGS

A. Suction Diffuser:

1. Angle pattern.
2. 175-psig pressure rating, ductile-iron body and end cap, pump-inlet fitting.
3. Bronze 16-mesh wire startup and Type 304 stainless steel permanent strainers with 3/16-inch .
4. Type 304 stainless steel straightening vanes.
5. Drain plug.
6. Factory-fabricated support.

2.6 ELECTRONICALLY COMMUTATED MOTOR (ECM)

A. Provide pumps so they are specified or scheduled with ECM.

1. Synchronous, constant torque, ECM with permanent magnet rotor. Rotor magnets to be time-stable, nontoxic ceramic magnets (Sr-Fe).
2. Driven by a frequency converter with an integrated power factor correction filter. Conventional induction motors will not be acceptable.
3. Each motor with an integrated variable-frequency drive, tested as one unit by manufacturer.
4. Motor speed adjustable over full range from 0 rpm to maximum scheduled speed.
5. Variable motor speed to be controlled by a 0- to 10 V-dc or 4- to 20-mA input.
6. Integrated motor protection verified by UL to protect the pump against over-/undervoltage, overtemperature of motor and/or electronics, overcurrent, locked rotor, and dry run (no-load condition).

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.

C. Examine foundations and inertia bases for suitable conditions where pumps will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PUMP INSTALLATION

A. Comply with HI 2.4.

B. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.

C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

D. Automatic Condensate Pump Units: Install units for collecting condensate and extend to open drain.

E. Equipment Mounting:

1. Install base-mounted pumps on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

F. Equipment Mounting: Install in-line pumps with continuous-thread hanger rods and spring hangers of size required to support weight of in-line pumps.

1. Comply with requirements for seismic-restraint devices specified in Section 230548.13 "Vibration Controls for HVAC."
2. Comply with requirements for hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

3.4 ALIGNMENT

A. Engage a factory-authorized service representative to perform alignment service.

B. Perform alignment service. When required by manufacturer to maintain warranty coverage, engage a factory-authorized service representative to perform it.

C. Comply with requirements in HI standards for alignment of pump and motor shaft. Add shims to the motor feet and bolt motor to base frame. Do not use grout between motor feet and base frame.

D. Comply with pump and coupling manufacturers' written instructions.

E. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

3.5 PIPING CONNECTIONS

A. Where installing piping adjacent to pump, allow space for service and maintenance.

B. Connect piping to pumps. Install valves that are same size as piping connected to pumps.

C. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

D. Install check, shutoff, and throttling valves on discharge side of pumps.

E. Install suction diffuser and shutoff valve on suction side of pumps.

1. Use startup strainer for initial system startup. Install permanent strainer element before turnover of system to City of New York.

F. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.

G. Install pressure gauges on pump suction and discharge or at integral pressure-gauge tapping, or install single gauge with multiple-input selector valve.

H. Install check valve on each condensate pump unit discharge unless unit has a factory-installed check valve.

3.6 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.7 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.8 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping. Use startup strainer for initial startup.
4. Perform the following startup checks for each pump before starting:

    a. Verify bearing lubrication.
    b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
    c. Verify that pump is rotating in correct direction.

5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
6. Start motor.
7. Open discharge valve slowly.

3.9 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Hydronic pumps will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate hydronic pumps.

END OF SECTION 232123

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Valves and specialties.
3. Refrigerants.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Solenoid valves.
2. Thermostatic expansion valves.
3. Hot-gas bypass valves.
4. Strainers.
5. Filter dryers.
6. Pressure-regulating valves.

B. Product Data Submittals: For each product.

1. Submit data for each type of refrigerant piping, fitting, valve, piping specialty, and refrigerant.

C. Engineering Services Submittals: For refrigerant piping size and layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

D. Sustainable Design Submittals:

1. Refrigerant: Product Data for refrigerants, indicating compliance with refrigerant management practices.

E. Shop Drawings:

1. Show piping size and piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.
2. Show interface and spatial relationships between piping and equipment.
3. Shop Drawing Scale: 1/4 inch equals 1 foot.

1.5 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports: For each field quality control test and inspection.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding, Brazing, and Fusing Qualifications."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store piping with end caps in place to ensure that piping interior and exterior are clean when installed.

B. Prepare valves and specialties for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads and other end connections.

C. Use the following precautions during storage:

1. Maintain valve and specialty end protection.
2. Store valves and specialties indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineered Services: Engage a qualified professional engineer licensed in the State of New York, as defined in Section DDC Genral Conditions, for refrigerant piping size and layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

B. Comply with ASHRAE 15.

C. Comply with ASME B31.5.

D. Test Pressure for Refrigerant R-134a:

1. Suction Tubing Refrigeration and Air-Conditioning Applications Other than Heat Pumps: 115 psig.
2. Suction Tubing for Heat-Pump Applications: 225 psig.
3. Hot-Gas and Liquid Tubing: 225 psig.

E. Test Pressure for Refrigerant R-410A:

1. Suction Tubing for Refrigeration and Air-Conditioning Applications Other than Heat Pumps: 300 psig.
2. Suction Tubing for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Tubing Lines: 535 psig.

2.2 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B88, Type K or L.

B. Wrought-Copper Fittings, Solder Joint: ASME B16.22.

C. Wrought-Copper Fittings, Brazed Joint: ASME B16.50.

D. Wrought-Copper Unions: ASME B16.22.

E. Solder Filler Metals: ASTM B32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

F. Brazing Filler Metals: AWS A5.8M/A5.8.

G. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch- long assembly.

4. Working Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

2.3 VALVES AND SPECIALTIES

A. Diaphragm Packless Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Danfoss, Inc.
   b. Henry Technologies Inc.; The Henry Group.
   c. Parker Hannifin Corporation.
   d. Or approved equal.

2. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
3. Diaphragm: Phosphor bronze and stainless steel with stainless steel spring.
4. Operator: Rising stem and hand wheel.
5. Seat: Nylon.
6. End Connections: Socket, union, or flanged.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 240 deg F.

B. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Danfoss, Inc.
   c. Emerson Climate Technologies; Emerson Electric Co.
   d. Henry Technologies Inc.; The Henry Group.
   e. Parker Hannifin Corporation.
   f. Or approved equal.

2. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
3. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
4. Piston: Removable polytetrafluoroethylene seat.
5. Closing Spring: Stainless steel.
6. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
7. End Connections: Socket, union, threaded, or flanged.
8. Maximum Opening Pressure: 0.50 psig.
9. Working Pressure Rating: 500 psig.
10. Maximum Operating Temperature: 275 deg F.

C. Service Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Danfoss, Inc.
   b. Emerson Climate Technologies; Emerson Electric Co.

c. Henry Technologies Inc.; The Henry Group.
d. JB Industries.
e. Parker Hannifin Corporation.
f. RectorSeal HVAC; a CSW Industrials Company.
g. Refrigeration Sales, Inc.
h. Or approved equal.

2. Body: Forged brass with brass cap, including key end to remove core.
3. Core: Removable ball-type check valve with stainless steel spring.
4. Seat: Polytetrafluoroethylene.
5. End Connections: Copper spring.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 deg F.

D. Refrigerant Locking Caps:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & D Valve, LLC.
b. JB Industries.
c. RectorSeal HVAC; a CSW Industrials Company.
d. Refrigeration Sales, Inc.
e. Or approved equal.

2. Description: Locking-type, tamper-resistant, threaded caps to protect refrigerant-charging ports from unauthorized refrigerant access and leakage.
3. Material: Brass, with protective shroud or sleeve.
4. Refrigerant Identification: Color-coded, refrigerant specific based on AHRI Guideline N Universal design.
5. Special Tool: For installing and unlocking.

E. Solenoid Valves: Comply with AHRI 760 I-P and UL 429; listed and labeled by an NRTL.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Danfoss, Inc.
b. Emerson Climate Technologies; Emerson Electric Co.
c. Henry Technologies Inc.; The Henry Group.
d. Parker Hannifin Corporation.
e. Or approved equal.

2. Body and Bonnet: Plated steel.
3. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
4. Seat: Polytetrafluoroethylene.
5. End Connections: Threaded.
6. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 24 115 V ac coil.
7. Working Pressure Rating: 400 psig.
8. Maximum Operating Temperature: 240 deg F.

F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Danfoss, Inc.
    b. Henry Technologies Inc.; The Henry Group.
    c. Parker Hannifin Corporation.
    d. Or approved equal.

2. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
3. Piston, Closing Spring, and Seat Insert: Stainless steel.
4. Seat: Polytetrafluoroethylene.
5. End Connections: Threaded.
6. Working Pressure Rating: 400 psig.
7. Maximum Operating Temperature: 240 deg F.

G. Thermostatic Expansion Valves: Comply with AHRI 750 I-P.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Danfoss, Inc.
    b. Emerson Climate Technologies; Emerson Electric Co.
    c. Henry Technologies Inc.; The Henry Group.
    d. Or approved equal.

2. Body, Bonnet, and Seal Cap: Forged brass or steel.
3. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
4. Packing and Gaskets: Non-asbestos.
5. Capillary and Bulb: Copper tubing filled with refrigerant charge.
6. Suction Temperature: 40 deg F.
7. Superheat: Adjustable Nonadjustable.
8. Reverse-flow option (for heat-pump applications).
9. End Connections: Socket, flare, or threaded union.
10. Working Pressure Rating: 450 psig.

H. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Danfoss, Inc.
    b. Henry Technologies Inc.; The Henry Group.
    c. Parker Hannifin Corporation.
    d. Or approved equal.

2. Body, Bonnet, and Seal Cap: Ductile iron or steel.
3. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
4. Packing and Gaskets: Non-asbestos.
5. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.

6. Seat: Polytetrafluoroethylene.
7. Equalizer: Internal External.
8. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter and 24 115 208 V ac coil.
9. End Connections: Socket.
10. Throttling Range: Maximum 5 psig.
11. Working Pressure Rating: 500 psig.
12. Maximum Operating Temperature: 240 deg F.

I. Straight-Type Strainers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Danfoss, Inc.
    b. Henry Technologies Inc.; The Henry Group.
    c. Parker Hannifin Corporation.
    d. Or approved equal.

2. Body: Welded steel with corrosion-resistant coating.
3. Screen: 100-mesh stainless steel.
4. End Connections: Socket or flare.
5. Working Pressure Rating: 500 psig.
6. Maximum Operating Temperature: 275 deg F.

J. Moisture/Liquid Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Danfoss, Inc.
    b. Emerson Climate Technologies; Emerson Electric Co.
    c. Henry Technologies Inc.; The Henry Group.
    d. Parker Hannifin Corporation.
    e. RLS LLC.
    f. Or approved equal.

2. Body: Forged brass.
3. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
4. Indicator: Color-coded to show moisture content in parts per million (ppm).
5. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
6. End Connections: Socket or flare.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 240 deg F.

2.4 REFRIGERANTS

A. R-134a, ASHRAE 34: Tetrafluoroethane.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arkema Inc.
b. DuPont Fluorochemicals Div.
c. Genetron Refrigerants; Honeywell International Inc.
d. Mexichem Fluor, Inc. (Koura).
e. Or approved equal.

B. R-410A, ASHRAE 34: Pentafluoroethane/Difluoromethane.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arkema Inc.
b. DuPont Fluorochemicals Div.
c. Genetron Refrigerants; Honeywell International Inc.
d. Mexichem Fluor, Inc. (Koura).
e. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PIPING APPLICATION SCHEDULES

A. Refrigerant: R-134a R-410A

B. Suction, Hot-Gas, and Liquid Tubing for Conventional Air-Conditioning (Cooling-Only) Applications, NPS 1-1/2 and Smaller: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed joints.

C. Suction, Hot-Gas, and Liquid Tubing for Conventional Air-Conditioning (Cooling-Only) Applications, NPS 4 and Smaller: Copper, Type L, drawn-temper tubing and wrought-copper fittings with brazed joints.

D. Suction, Hot-Gas, and Liquid Tubing for Conventional Air-Conditioning (Cooling-Only) Applications, NPS 2 to NPS 4: Copper, Type L, drawn-temper tubing and wrought-copper fittings with brazed joints.

E. Safety-Relief-Valve Discharge Tubing for Conventional Air-Conditioning (Cooling-Only) Applications, Copper: Type L, drawn-temper tubing and wrought-copper fittings with brazed joints.

F. Safety-Relief-Valve Discharge Piping for Conventional Air-Conditioning (Cooling-Only) Applications, Steel: Schedule 40, black steel and wrought-steel fittings with welded joints.

3.3 VALVE AND SPECIALTY APPLICATIONS

A. Install diaphragm packless valves in suction and discharge lines of compressor.

B. Install service valves for gauge taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.

D. Except as otherwise indicated, install diaphragm packless valves on inlet and outlet side of filter dryers.

E. Install a full-size, three-valve bypass around filter dryers.

F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.

G. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.
2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

H. Install safety-relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside in accordance with ASHRAE 15.

I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for the device being protected:

1. Solenoid valves.
2. Thermostatic expansion valves.
3. Hot-gas bypass valves.
4. Compressor.

K. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.

L. Install receivers sized to accommodate pump-down charge.

M. Install flexible connectors at compressors.

N. Provide refrigerant locking caps on refrigerant charging ports that are located outdoors unless otherwise protected from unauthorized access by a means acceptable to 2014 NYC Building Codes.

3.4 INSTALLATION OF PIPING, GENERAL

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping in accordance with ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Refer to Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control" for solenoid valve controllers, control wiring, and sequence of operation.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in protective conduit where installed belowground.

N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

O. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.
2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

S. Identify refrigerant piping and valves in accordance with Section 230553 "Identification for HVAC Piping and Equipment."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

3.5 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints in accordance with ASTM B828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints in accordance with AWS BRH, "Brazing Handbook," Ch. 35, "Pipe and Tubing."

1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

F. Threaded Joints: Thread steel pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and to restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.

H. Welded Joints: Construct joints in accordance with AWS D10.12M/D10.12.

I. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic restraints in Section 230548.13 "Vibration Controls for HVAC."

B. Comply with Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

C. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 ft. long.
2. Roller hangers and spring hangers for individual horizontal runs 20 ft. or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 ft. or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

D. Install hangers for copper tubing, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, or the provisions of the 2014 NYC Building Code, whichever are most stringent.

E. Support horizontal piping within 12 inches of each fitting.

F. Support vertical runs of copper tubing to comply with MSS SP-58, or of the provisions of the 2014 NYC Building Code, whichever are most stringent.

3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.

3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System must maintain test pressure at the manifold gauge throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

B. Prepare test and inspection reports.

3.8 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.9 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves but not bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 232513 - WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes the following water treatment for closed-loop hydronic systems:

1. Manual Automatic chemical-feed equipment.
2. Chemicals.

1.3 DEFINITIONS

A. RO: Reverse osmosis.

B. TDS: Total dissolved solids consist of salts and other materials that combine with water as a solution.

C. TSS: Total suspended solids include both organic and inorganic solids that are suspended in the water. These solids may include silt, plankton, and industrial wastes.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, and furnished specialties and accessories for the following products:

1. Bypass feeders.
2. Water meters.
3. Inhibitor injection timers.
4. pH controllers.
5. Chemical solution tanks.
6. Injection pumps.
7. Chemical-treatment test equipment.
8. Chemical material safety data sheets.
9. Inhibited propylene glycol.

B. Shop Drawings: Pretreatment and chemical-treatment equipment, showing tanks, maintenance space required, and piping connections to hydronic systems.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Water-Analysis Provider Qualifications: Verification of experience and capability of HVAC water-treatment service provider.

C. Field quality-control reports.

D. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in "Performance Requirements" Article.

E. Water Analysis: Illustrate water quality available at Project site.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sensors, injection pumps, and controllers to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. HVAC Water-Treatment Service Provider Qualifications: An HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

PART 2 - PRODUCTS

2.1 HVAC WATER-TREATMENT MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anderson Chemical Company.
2. Cascade Water Services, Inc.
3. Nalco; an Ecolab company.
4. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. Provide all hardware, chemicals, and other material necessary to maintain HVAC water quality in all systems, as indicated in this Specification. Water quality for hydronic systems must minimize corrosion, scale buildup, and biological growth for optimum efficiency of hydronic equipment without creating a hazard to operating personnel or the environment.

B. Base HVAC water treatment on quality of water available at Project site, hydronic system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of 2014 NYC Building Codes.

C. Closed hydronic systems, including hot-water heating below 250 deg F must have the following water qualities:

1. pH: Maintain a value within 8.5-10.5.
2. Steel Corrosion Inhibiters: Provide sufficient inhibitors to limit mild steel corrosion to 0.5 mils per year. Maintain soluble iron concentrations below 3.0 ppm.
3. Yellow Metal Corrosion Inhibitor: Provide sufficient copper and brass corrosion inhibitors to limit copper corrosion to 3-5 mils per year. Maintain soluble copper concentrations at or below 0.33-0.5 mg/L.
4. Scale Control: Provide softened water for initial fill and makeup. Where softened water is not used, provide sufficient scale inhibitors to prevent formation of scale and maintain all scale-forming material in solution.
5. Dispersants: Provide sufficient dispersants to prevent sedimentation of fine particulate matter.
6. Microbiological Limits:

    a. Total Aerobic Plate Count: Maintain a maximum value of 500 organisms/mL.
    b. Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/mL.

2.3 MANUAL CHEMICAL-FEED EQUIPMENT

A. Bypass Feeders: Provide steel feeders with corrosion-resistant exterior coating, minimum 3-1/2-inch fill opening in the top, and NPS 3/4 bottom inlet and top side outlet. Provide quarter turn or threaded fill cap with gasket seal and diaphragm to lock the top on the feeder when exposed to system pressure in the vessel.

1. Capacity: 5 gal. .
2. Minimum Working Pressure: 175 psig .

2.4 AUTOMATIC CHEMICAL-FEED EQUIPMENT

A. Chemical Solution Tanks:

1. Chemical-resistant reservoirs fabricated from high-density opaque polyethylene with minimum 110 percent containment vessel.
2. Molded cover with recess for mounting pump.
3. Capacity: 30 gal. .

B. Chemical Solution Injection Pumps:

1. Self-priming, positive displacement; rated for intended chemical with minimum 25 percent safety factor for design pressure and temperature.
2. Adjustable flow rate.
3. Metal and thermoplastic construction.
4. Built-in relief valve.
5. Fully enclosed, continuous-duty, single-phase motor. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Chemical Solution Tubing: Polyethylene tubing with compression fittings and joints except ASTM A269/A269M, Type 304 stainless steel for steam boiler injection assemblies.

D. Injection Assembly:

1. Quill: Minimum NPS 1/2 with insertion length sufficient to discharge into at least 25 percent of pipe diameter.
2. Ball Valve: Two-piece, stainless steel; selected to fit quill.
3. Packing Gland: Mechanical seal on quill of sufficient length to allow quill removal during system operation.
4. Assembly Pressure/Temperature Rating: Minimum 600 psig at 200 deg F.

2.5 CHEMICAL-TREATMENT TEST EQUIPMENT

A. Test Kit: Manufacturer-recommended equipment and chemicals in a wall-mounted cabinet for testing pH, corrosion inhibitors, alkalinity, hardness, and other properties recommended by manufacturer.

B. Corrosion Test-Coupon Assembly: Constructed of corrosive-resistant material, complete with piping, valves, and mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test-coupon assembly.

1. Two -station rack for closed-loop systems.

2.6 CHEMICALS

A. Chemicals must be as recommended by water-treatment system manufacturer, compatible with piping system components and connected equipment, and able to attain water quality specified in "Performance Requirements" Article.

2.7 INHIBITED ETHYLENE GLYCOL AND PROPYLENE GLYCOL

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dow Chemical Company (The).
2. Dynalene.
3. Fremont Industries.
4. Houghton Chemical Corp.
5. Or approved equal.

B. Inhibited Propylene Glycol:

1. Propylene glycol with inhibitor additive, to provide freeze protection for heat-transfer fluid and corrosion protection for carbon steel, brass, copper, stainless steel, and cast-iron piping and fittings.
2. Inhibitor creates a passive layer on all surfaces that contact propylene glycol to prevent corrosion and stabilizes fluid pH, to compensate for acids formed from glycol degradation.
3. pH value must be maintained between 9.0 - 10.5, with reserve alkalinity greater than 9.0mL.
4. Concentrated inhibited propylene glycol is to be 95.5 percent propylene glycol by weight and 4.5 percent performance additives.
5. Concentrated inhibited propylene glycol is mixed with water in proper proportion specified by the manufacturer to provide freeze protection to minus 20 deg F. Premixed heat-transfer fluid may be used, or glycol/water mixture may be prepared at the time of installation. Use only deionized water for mixing.
6. Provide only propylene glycol that is specifically blended for HVAC application. Automotive-type antifreeze is unacceptable.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 WATER ANALYSIS

A. Perform an analysis of supply water to determine quality of water available at Project site.

3.3 INSTALLATION

A. Install chemical-application equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units, so controls and devices that require servicing are accessible. Anchor chemical tanks and floor-mounting accessories to substrate. Install all chemical application equipment within a spill-containment area without floor drain.

B. Install seismic restraints for equipment and floor-mounting accessories, and anchor to building structure. Comply with requirements in Section 230548.13 "Vibration Controls for HVAC" for seismic restraints.

C. Install water-testing equipment on wall near water-chemical-application equipment.

D. Install interconnecting control wiring for chemical-treatment controls and sensors.

E. Mount sensors and injectors in piping circuits.

F. Bypass Feeders: Install in closed hydronic systems, including hot-water heating,, and equip with the following:

1. Install bypass feeder in a bypass circuit around circulating pumps unless indicated otherwise on Drawings.
2. Install test-coupon assembly in bypass circuit around circulating pumps unless otherwise indicated on Drawings.
3. Install a gate or full-port ball isolation valves on inlet, outlet, and drain below the feeder inlet.
4. Install a swing check on the inlet after the isolation valve.

G. Install automatic fluid make-up equipment for glycol water system, and include the following:

1. Chemical solution tanks.
2. Chemical solution injection pumps.
3. Water meter in makeup supply to system.
4. Pressure switch to operate injection pump as necessary to maintain glycol system pressure.

3.4 PIPING CONNECTIONS

A. Piping installation requirement are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

C. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Dielectric fittings are specified in Section 232113 "Hydronic Piping."

D. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Section 230523.12 "Ball Valves for HVAC Piping," and Section 230523.13 "Butterfly Valves for HVAC Piping."

E. Comply with requirements in Section 221119 "Domestic Water Piping Specialties" for backflow preventers required in makeup-water connections to potable-water systems.

3.5 ELECTRICAL CONNECTIONS

A. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:
   1. Inspect field-assembled components and equipment installation, including piping and electrical connections.
   2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.
   3. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of hydronic systems' startup procedures.
   4. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
   5. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
   6. Leave uncovered and unconcealed new, altered, extended, and replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
   7. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test pressure to stand for four hours. Leaks and loss in test pressure constitute defects.
   8. Repair leaks and defects with new materials, and retest piping until no leaks exist.

C. Equipment will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. At eight -week intervals following Substantial Completion, perform separate water analyses on hydronic systems to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section. Submit written reports of water analysis, advising City of New York of changes necessary to adhere to "Performance Requirements" Article.

F. Comply with ASTM D3370 and with the following standards:
   1. Silica: ASTM D859.
   2. Acidity and Alkalinity: ASTM D1067.
   3. Iron: ASTM D1068.
   4. Water Hardness: ASTM D1126.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate HVAC water-treatment systems and equipment.

END OF SECTION 232513

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round ducts and fittings.
4. Sheet metal materials.
5. Duct liner.
6. Sealants and gaskets.
7. Hangers and supports.

B. Related Requirements:

1. Section 230548.13 "Vibration Controls for HVAC" for seismic restraint devices and installation.
2. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
3. Section 233119.13 "Shop-Fabricated HVAC Casings" for field-fabricated casings for mechanical equipment.
4. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Sustainable Design Submittals:

1. Product Data: For ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."
2. Ventilation: Product Data for ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Product Data: For adhesives, indicating VOC content.
4. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
5. Product Data: For sealants, indicating VOC content.
6. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
7. Laboratory Test Reports: For antimicrobial coatings, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top and bottom of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

D. Engineering Services Submittals:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
5. Engineering Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York, responsible for their preparation for selecting hangers and supports and seismic restraints.

E. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Ductwork: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints are to withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7. SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Seismic Hazard Level (SHL): B.
2. Connection Level: 1.

C. Seismic Performance: Ductwork to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7. See Section 230548 "Vibration and Seismic Controls for HVAC."

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

D. Wind Performance: Ducts are to withstand the effects of wind determined in accordance with to ASCE/SEI 7. See Section 230548.13 "Vibration Controls for HVAC."

E. Airstream Surfaces: Surfaces in contact with airstream comply with requirements in ASHRAE 62.1.

F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."

G. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

H. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts exposed to weather, construct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by the Commissioner.
3. Where specified for specific applications, all joints are to be welded.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All longitudinal seams are to be Pittsburgh lock seams unless otherwise specified for specific application.

1. Where specified for specific applications, all joints are to be welded.

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. McGill AirFlow LLC.
2. MKT Metal Manufacturing.
3. Sheet Metal Connectors, Inc.
4. Or approved equal.

B. Source Limitations: Obtain double-wall rectangular ducts and fittings from single manufacturer.

C. Rectangular Ducts: Fabricate ducts with indicated dimensions for clear internal dimensions of the inner duct.

D. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts exposed to weather, construct outer duct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

E. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by the Commissioner.
3. Where specified for specific applications, all joints are to be welded.

F. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All longitudinal seams are to be Pittsburgh lock seams unless otherwise specified for specific application.

1. Where specified for specific applications, all joints are to be welded.

G. Interstitial Insulation, Fibrous Glass: Duct liner complying with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

H. Inner Duct: Minimum 24-gauge perforated galvanized sheet steel having 3/32-inch- diameter perforations, with overall open area of 23 percent .

2.4 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.

2. For ducts exposed to weather, construct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Elgen Manufacturing.
    b. GSI; a DMI Company.
    c. Linx Industries (formerly Lindab).
    d. McGill AirFlow LLC.
    e. MKT Metal Manufacturing.
    f. Nordfab Ducting.
    g. SEMCO, LLC; part of FlaktGroup.
    h. Set Duct Manufacturing.
    i. Sheet Metal Connectors, Inc.
    j. Spiral Manufacturing Co., Inc.
    k. Stamped Fittings Inc.
    l. Or approved equal.

B. Source Limitations: Obtain single-wall round ducts and fittings from single manufacturer.

C. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

D. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

E. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

F. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.5 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials are to be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G90.
2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils thick on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil thick on opposite surface.
3. Coating Materials: For use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.

D. Carbon-Steel Sheets: Comply with ASTM A1008/A1008M, with oiled, matte finish for exposed ducts.

E. Stainless Steel Sheets: Comply with ASTM A480/A480M, Type 304 or 316, as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish is to be No. 2B, No. 2D, No. 3, or No. 4 as indicated in "Duct Schedule" Article.

F. Aluminum Sheets: Comply with ASTM B209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

G. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating is to be applied to the exterior surface.
2. Antimicrobial compound is to be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound is to have a hardness of 2H, minimum, when tested in accordance with ASTM D3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
5. Shop-Applied Coating Color: Black .
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

H. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

I. Tie Rods: Galvanized steel, 1/4-inch- minimum diameter for lengths 36 inches or less; 3/8-inch- minimum diameter for lengths longer than 36 inches.

2.6 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Certainteed; SAINT-GOBAIN.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Owens Corning.
    e. Sekisui Voltek, LLC.
    f. Or approved equal.

2. Source Limitations: Obtain fibrous-glass duct liner from single manufacturer.
3. Maximum Thermal Conductivity:

    a. Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
    b. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

4. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound is to be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
5. Solvent Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C916.

    a. Adhesive must have a VOC content of 80 g/L or less.
    b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C534/C534M, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Aeroflex USA.
    b. Armacell LLC.
    c. Ductmate Industries, Inc.
    d. K-Flex USA.
    e. Sekisui Voltek, LLC.
    f. Or approved equal.

2. Source Limitations: Obtain flexible elastomeric duct liner from single manufacturer.
3. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

    a. Adhesive must have a VOC content of 80 g/L or less.
    b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Fibrous-Glass-Free, Natural-Fiber Duct Liner: Made from partially recycled cotton or polyester products and containing no fiberglass. Airstream surface overlaid with fire-resistant facing to prevent surface erosion by airstream, complying with NFPA 90A or NFPA 90B. Treat natural-fiber products with antimicrobial coating.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Acoustical Surfaces, Inc.
    b. Ductmate Industries, Inc.
    c. John-Mansville.
    d. Or approved equal.

2. Source Limitations: Obtain fibrous-glass-free, natural-fiber duct liner from single manufacturer.
3. Maximum Thermal Conductivity: 0.24 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature when tested in accordance with ASTM C518.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with ASTM E84; certified by an NRTL.
5. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

    a. Adhesive must have a VOC content of 80 g/L or less.
    b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick aluminum ; with beveled edge sized as required to hold insulation securely in place, but not less than 1-1/2 inches in diameter.

E. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm or greater.

7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

    a. Fan discharges.
    b. Intervals of lined duct preceding unlined duct.
    c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.

9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.

    a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.7 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets are to be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches .
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. Sealant must have a VOC content of 420 g/L or less.
11. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Sealant must have a VOC content of 420 g/L or less.
9. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
10. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. Sealant must have a VOC content of 420 g/L or less.
7. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal is to provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and is to be rated for10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.

3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.8 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.

E. Steel Cables for Stainless Steel Ducts: Stainless steel complying with ASTM A492.

F. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless Steel Ducts: Stainless steel shapes and plates.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

J. Install fire, combination fire/smoke, and smoke dampers where indicated on Drawings and as required by the 2014 NYC Building Code. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.

K. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

M. Elbows: Use long-radius elbows wherever they fit.

1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.

N. Branch Connections: Use lateral or conical branch connections.

3.3 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.4 DUCTWORK EXPOSED TO WEATHER

A. All external joints are to be welded. Seal all openings to provide weatherproof construction.

B. Construct ductwork to resist external loads of wind, snow, ice, and other effects of weather. Provide necessary supporting structures.

C. Single Wall:

1. Ductwork is to be Type 316 stainless steel.
2. Ductwork is to be galvanized steel.

    a. If duct outer surface is uninsulated, protect outer surface with suitable paint. Paint materials and application requirements are specified in Section 099113 "Exterior Painting."

3. Where ducts have external insulation, provide weatherproof aluminum jacket. See Section 230713 "Duct Insulation."

D. Double Wall:

1. Ductwork complies with requirements in "Double-Wall Rectangular Ducts and Fittings" or "Double-Wall Round Ducts and Fittings" Article.
2. Ductwork outer wall is to be Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.
3. Provide interstitial insulation.

3.5 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.

10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints. Coordinate with Section 230548 "Vibration and Seismic Controls for HVAC."

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.7 DUCTWORK CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.8 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.
    b. Supply Ducts with a Pressure Class of 2- Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.
    c. Return Ducts with a Pressure Class of 2- Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.
    d. Exhaust Ducts with a Pressure Class of 2- Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.
    e. Outdoor-Air Ducts with a Pressure Class of 2- Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
5. Test for leaks before applying external insulation.
6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
7. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by the Commissioner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media is to not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use duct cleaning methodology as indicated in NADCA ACR.

C. Use service openings for entry and inspection.

1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

D. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

E. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

F. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.

5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.11 STARTUP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.12 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units :

a. Pressure Class: Positive 2- inch wg.
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

2. Ducts Connected to Variable-Air-Volume Air-Handling Units :

a. Pressure Class: Positive 3- inch wg.
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive 2- inch wg.
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

C. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units :

a. Pressure Class: Positive or negative 1- inch wg.
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 4.

2. Ducts Connected to Air-Handling Units :

   a. Pressure Class: Positive or negative 2- inch wg.
   b. Minimum SMACNA Seal Class: B.
   c. SMACNA Leakage Class for Rectangular: 4.

3. Ducts Connected to Equipment Not Listed above:

   a. Pressure Class: Positive or negative 2- inch wg.
   b. Minimum SMACNA Seal Class: B.
   c. SMACNA Leakage Class for Rectangular: 4.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

   a. Pressure Class: Negative 2- inch wg.
   b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
   c. SMACNA Leakage Class for Rectangular: 4.
   d. SMACNA Leakage Class for Round and Flat Oval: 4.

2. Ducts Connected to Air-Handling Units :

   a. Pressure Class: Positive or negative 2- inch wg.
   b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
   c. SMACNA Leakage Class for Rectangular: 4.
   d. SMACNA Leakage Class for Round and Flat Oval: 4.

3. Ducts Connected to Equipment Not Listed above:

   a. Pressure Class: Positive or negative 2- inch wg.
   b. Minimum SMACNA Seal Class: B if negative pressure; A if positive pressure.
   c. SMACNA Leakage Class for Rectangular: 4.
   d. SMACNA Leakage Class for Round and Flat Oval: 4.

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units :

   a. Pressure Class: Positive or negative 1- inch wg.
   b. Minimum SMACNA Seal Class: A.
   c. SMACNA Leakage Class for Rectangular: 8.
   d. SMACNA Leakage Class for Round and Flat Oval: 8.

2. Ducts Connected to Equipment Not Listed Above:

   a. Pressure Class: Positive or negative 2- inch wg.
   b. Minimum SMACNA Seal Class: A.
   c. SMACNA Leakage Class for Rectangular: 4.

d. SMACNA Leakage Class for Round and Flat Oval: 4.

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.

2. Stainless Steel Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

3. Aluminum Ducts: Aluminum.

G. Liner:

1. Supply-Air Ducts: Fibrous glass, Type I , 1-1/2 inch thick.
2. Return-Air Ducts: Fibrous glass, Type I , 1 inch thick.
3. Exhaust-Air Ducts: Fibrous glass, Type I, 1 inch thick.
4. Supply Fan Plenums: Fibrous glass, Type II, 2 inch thick.
5. Return- and Exhaust-Fan Plenums: Fibrous glass, Type II, 2 inches thick.
6. Transfer Ducts: Fibrous glass, Type I , 1 inch thick.

H. Double-Wall Duct Interstitial Insulation:

1. Supply-Air Ducts: 2 inch thick.
2. Return-Air Ducts: 2 inch thick.
3. Exhaust-Air Ducts: 2 inch thick.

I. Elbow Configuration:

1. Rectangular Duct - Requirements for Different Velocities: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.

3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct - Requirements for All Velocities: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

J. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

a. Rectangular Main to Rectangular Branch: 45-degree entry.
b. Rectangular Main to Round Branch: Conical spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpm or Lower: 90-degree tap.
b. Velocity 1000 to 1500 fpm: Conical tap.
c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233119.13 - SHOP-FABRICATED HVAC CASINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Shop-fabricated casings.
2. Casing interstitial insulation.
3. Casing liner.
4. Sealant materials.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.
2. Product Data: For adhesives, indicating VOC content.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Product Data: For sealants, indicating VOC content.
5. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
6. Laboratory Test Reports: For antimicrobial coatings, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For HVAC casings.

1. Include plans, elevations, sections, and attachment details.
2. Include details of HVAC casing assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

    a. Sheet metal thickness(es).
    b. Insulati
    c. Reinforcement and spacing.
    d. Seam and joint construction.
    e. Access doors including frames, hinges, and latches.
    f. Fan, filter, coil, humidifier, and other apparatus being installed in and mounted on casing.
    g. Locations for access to internal components.
    h. Hangers and supports including methods for building attachment, vibration isolation, seismic restraints, and casing attachment.
    i. Interior lighting, including switches.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for shop-fabricated HVAC casings, accessories, and components, from fabricator.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Welding certificates.

C. Product Certificates: For each type of casing.

1. For insulation properties, for the insulation material, and complete panel assembly, from fabricator.
2. For static-pressure ratings of complete panel assembly, from fabricator.
3. Product Certificates: For acoustical performance of each casing, from fabricator.

    a. Show sound-absorption coefficients in each octave band. Coefficients to be equal to or lower than those scheduled when tested in accordance with ASTM C 423.
    b. Show airborne sound transmission losses. Losses to be equal to or lower than those scheduled when tested in accordance with ASTM E 90.

4. Casing Performance: Submit calculations indicating that the proposed casing construction will achieve the required static-pressure classification, acoustical performance, and structural performance.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for casing joint and seam welding.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases and roof curbs with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

1. Verify that base height is sufficient to accommodate required drain trap depth.

B. Coordinate sizes and locations of steel supports. Supports are specified in Section 055000 "Metal Fabrications."

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

1. Verify that roof curb height is sufficient to accommodate required drain trap depth.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Static-Pressure Classes:

1. Upstream from Fan(s): 2 inch wg.
2. Downstream from Fan(s): 3 inch wg.

B. Thermal Performance for Assembled Casing Panel:

1. 2-Inch Panel: 0.12 Btu/h x sq. ft. x deg F.
2. 4-Inch Panel: 0.06 Btu/h x sq. ft. x deg F.

C. Acoustical Performance for Assembled Casing Panel:

1. NRC: 1.09 in accordance with ASTM C 423.
2. STC: 40 in accordance with ASTM E 90.

D. Structural Performance:

1. Fabricate casings to withstand 133 percent of the indicated static pressure without structural failure. Wall and roof deflection at the indicated static pressure must not exceed 1/8 inch/foot.

    a. Fabricate outdoor casings to withstand wind load of 15 lbf/sq. ft.
    b. Fabricate outdoor casings to withstand snow load of 30 lbf/sq. ft..

E. Flammability:

1. Insulation and Other Materials Exposed to the Airstream:

    a. All materials exposed to the airstream to comply with requirements of NFPA 90A or NFPA 90B when tested in accordance with ASTM E 84.

F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

G. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

H. Seismic Performance: HVAC casings must withstand the effects of earthquake motions determined in accordance with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" and ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

2.2 GENERAL CASING FABRICATION REQUIREMENTS

A. General Casing Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 9, "Equipments and Casings," for acceptable construction details related to required static-pressure classes.

B. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 9, "Equipment and Casings," for acceptable materials, material thicknesses, and casing construction methods unless otherwise indicated. Sheet metal materials to be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

1. Fabricate casings with more than 3-inch wg negative static pressure in accordance with SMACNA's "Rectangular Industrial Duct Construction Standards."
2. Fabricate casings with more than 2-inch wg positive static pressure in accordance with SMACNA's "Rectangular Industrial Duct Construction Standards."

C. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Exterior-Surface Galvanized Coating Designation: G90.
2. Interior-Surface Galvanized Coating Designation:

a. Sections Not Exposed to Moisture: G90.
b. Sections Housing and Downstream from Cooling Coil and Humidifiers: G90.

D. Stainless Steel: ASTM A 480/A 480M, Type 304, and having a No. 2D finish.

E. Shop-Applied Antimicrobial Coating:

1. Apply to the interior sheet metal surfaces of casing in contact with the airstream. Apply untreated clear coating to the exterior surface.
2. Use only antimicrobial compound tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating Hardness: 2H minimum when tested in accordance with ASTM D 3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 in accordance with UL 723; certified by an NRTL.
5. Applied Coating Color: Standard.

F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Sealing Requirement: SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Seal Class A. Seal all seams, joints, connections, and abutments to building.

H. Access Doors: Fabricate access doors in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 9-15, "Casing Access Doors - 2-inch wg," and Figure 9-16, "Casing Access Doors - 3-10-inch wg"; and in accordance with pressure class of the plenum or casing section in which access doors are to be installed.

1. Size: 20 by 54 inches.
2. Vision Panel: Double-glazed, wire-reinforced safety glass with an airspace between panes and sealed with interior and exterior rubber seals.
3. Hinges: Piano or butt hinges and latches; number and size in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
4. Latches: Minimum of two wedge-lever-type latches; operable from inside and outside.
5. Neoprene gaskets around entire perimeters of door frames.
6. Install doors to open against air pressure.

I. Condensate Drain Pans: Formed sections of Type 304, stainless steel sheet complying with requirements in ASHRAE 62.1. Extend pans a minimum of 12 inches past coil.

1. Construct pans with a double-wall having space between walls filled with foam insulation and sealed moisture tight.
2. Insulation: Polystyrene or polyurethane.
3. For units with stacked coils or stacked eliminators, provide intermediate drain pan or drain trough to collect condensate from each coil row. Provide downcomer to conduct condensate from intermediate pan or trough into lower drain pan. Intermediate drain pan, trough, and downcomer to be constructed of 20-gauge, Type 304, stainless steel.
4. Slope drain pan floor in a minimum of two planes to collect condensate from cooling coils (including coil piping connections and return bends), eliminators, and humidifiers when units are operating at maximum catalogued face velocity across cooling coil. All condensate to drain from pan without any standing water.

5. Provide trap for each drain pan connection. Dimension trap as detailed on Drawings.

2.3 SHOP-FABRICATED CASINGS

A. Single- and Double-Wall Casings: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for sheet metal thickness based on indicated static-pressure class unless otherwise indicated.

1. Outer Panel: Galvanized sheet steel .

B. Fabricate casings with standing seams and angle-iron reinforcements unless otherwise indicated.

C. Fabricate close-off sheets from casing to dampers, filter frames, and coils and between stacked coils. Use G90 galvanized sheet steel of same thickness as outer casing.

D. Bolt close-off sheets to frame flanges and housings. Support coils on stands fabricated from galvanized-steel angles or channels.

E. Reinforce casings with galvanized-steel angles.

F. Double-Wall Casing Inner Panel, Perforated: Galvanized sheet steel having 3/32-inch- diameter perforations, with overall open area of 23 percent. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for sheet metal thickness based on indicated static-pressure class unless otherwise indicated.

2.4 CASING INTERSTITIAL INSULATION

A. Casing insulation is used to fill the interstitial void between inner and outer panel wall in double-wall casing construction and provides thermal and acoustic insulation.

B. Interstitial Insulation, Polyurethane Foam: Polyurethane foam complying with requirements of NFPA 90A or NFPA 90B when tested in accordance with ASTM E 84.

1. Casing Wall Thickness: 2 inches.
2. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

C. Interstitial Insulation, Fibrous Glass: Fibrous-glass insulation complying with ASTM E 84, NFPA 90A, or NFPA 90B; and with NAIMA AH124.

1. Casing Wall Thickness: 2 inches.
2. Maximum Thermal Conductivity of Composite Panel: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with NFPA 701.

2.5 CASING LINER

A. Casing liner is applied to the inner side of the panel in single-wall casing construction and provides thermal and acoustic insulation. The inner surface is exposed to the airstream.

B. Fibrous-Glass Casing Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Owens Corning.
    e. Or approved equal.

2. Source Limitations: Obtain casing liner from single source from single manufacturer.
3. Maximum Thermal Conductivity:

    a. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

4. Antimicrobial Erosion-Resistant Coating: Apply to surface of the liner that will form the interior surface of casing to act as a moisture repellent and an erosion-resistant coating. Use only antimicrobial compound tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
5. Solvent Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

    a. Adhesive must have a VOC content of 80 g/L or less.
    b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized steel, with beveled edge sized as required to hold insulation securely in place, but not less than 1-1/2 inches in diameter.

D. Shop or Factory Application of Casing Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of casing liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of casing liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of casings or cut and fit to ensure butted-edge overlapping.
5. Apply adhesive coating on longitudinal seams in casings with air velocity of 2500 fpm.

6. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
7. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from casing wall. Fabricate edge facings at the following locations:

    a. Fan discharges.
    b. Intervals of lined casing preceding unlined duct.
    c. Upstream edges of transverse joints in casings where air velocities are higher than 2500 fpm or where indicated.

8. Secure insulation between perforated sheet metal inner wall of same thickness as specified for outer wall. Use mechanical fasteners that maintain inner wall at uniform distance from outer wall without compressing insulation.

2.6 SEALANT MATERIALS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets to have a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. Sealant must have a VOC content of 420 g/L or less.
7. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
8. Maximum Static-Pressure Class: 10 inch wg, positive or negative.
9. Service: Indoor or outdoor.
10. Substrate: Compatible with galvanized sheet steel or stainless steel.

C. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Sealant must have a VOC content of 420 g/L or less.

9. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
10. Maximum Static-Pressure Class: 10 inch wg, positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel or stainless steel.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single component, acid curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. Sealant must have a VOC content of 420 g/L or less.
7. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine concrete bases roof curbs and steel supports for compliance with requirements for conditions affecting installation and performance of HVAC casings. Verify that there is sufficient clearance for access and to install all piping, condensate traps, ductwork, and other fittings.

B. Examine casing insulation materials and liners before installation. Reject casings that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install casings in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Equipment Mounting:

1. Where indicated on Drawings, install HVAC casings on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

2. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548.13 "Vibration Controls for HVAC."
3. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

C. Apply sealant to joints, connections, and mountings.

D. Field-cut openings for pipe and conduit penetrations through casing walls; insulate and seal in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Seal all penetrations airtight. Cover with escutcheons and gaskets, or fill with suitable compound so there is no exposed insulation. Provide shaft seals where fan shafts penetrate casing.

F. Support casings on base or foundation system. Secure and seal to base.

G. Support components rigidly with ties, braces, brackets, seismic restraints, and anchors of types that will maintain housing shape and prevent buckling.

H. Align casings accurately at connections, with 1/8-inch misalignment tolerance and with smooth interior surfaces.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a shop-authorized service representative.

B. Tests and Inspections:

1. Perform field tests of all fire dampers and control dampers, demonstrating that they open and close fully and without binding or excessive friction.
2. Inspect all duct and casing access doors and other openings having movable covers, demonstrating that they are reasonably accessible, open and close fully without binding or excessive fiction, and when fully closed, they seal properly.
3. Perform field tests and inspections including air-duct leakage testing of supply-, return-, and exhaust-air ducts in accordance with SMACNA's "HVAC Air Duct Leakage Test Manual."
4. Test the following systems:

    a. Systems required by ASHRAE/IES 90.1.
    b. Supply Air: 100 percent of total installed duct area with a pressure class of 3 inch wg or higher.

5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
6. Determine leakage from entire system or section of system by relating leakage to surface area of test section. Comply with requirements for leakage classification of ducts connected to casings.
7. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.

C. HVAC casings will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 CLEANING

A. Comply with requirements for cleaning in Section 233113 "Metal Ducts."

END OF SECTION 233119.13

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Ceiling radiation dampers.
7. Smoke dampers.
8. Combination fire and smoke dampers.
9. Flange connectors.
10. Duct silencers.
11. Turning vanes.
12. Remote damper operators.
13. Duct-mounted access doors.
14. Duct access panel assemblies.
15. Flexible connectors.
16. Duct accessory hardware.

B. Related Requirements:

1. Section 233346 "Flexible Ducts" for insulated and non-insulated flexible ducts.
2. Section 284621.11 "Addressable Fire-Alarm Systems" for duct-mounted fire and smoke detectors.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop, dynamic insertion loss, and self-generated noise data. Include breakout noise calculations for high-transmission-loss casings.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

C. Shop Drawings: For duct accessories. Include plans, elevations, sections, details, and attachments to other work.

1. Detail duct accessories' fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor-damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Duct security bars.
f. Include diagrams for power, signal, and control wiring.

D. Coordination Drawings: Reflected ceiling plans, or BIM model, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from installers of the items involved.

1.5 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 90A and NFPA 90B.

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials must be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Or approved equal.

B. Description: Gravity balanced.

C. Performance:

1. Maximum Air Velocity: 1250 fpm.
2. Maximum System Pressure: 2 inches wg.
3. AMCA Certification: Test and rate in accordance with AMCA 511.
4. Leakage:

a. Class I: Leakage must not exceed 4 cfm/sq. ft. against 1-inch wg differential static pressure.

D. Construction:

1. Frame:

a. Hat shaped.
b. 16-gauge- thick, galvanized sheet steel, with welded or mechanically attached corners and mounting flange.

2. Blades:

a. Multiple single-piece blades.
b. Center pivoted, maximum 6-inch width, 16-gauge- thick, galvanized sheet steel with sealed edges.

3. Blade Action: Parallel.

E. Blade Seals: Neoprene, mechanically locked.

F. Blade Axles:

1. Material: Nonferrous metal .
2. Diameter: 0.20 inch.

G. Tie Bars and Brackets: Aluminum .

H. Return Spring: Adjustable tension.

I. Bearings: Brass sleeve.

J. Damper Actuator - Electric:

1. Electric - 24 V ac.
2. UL 873 plenum rated.
3. Two position, Fully modulating and with fail-safe spring return when required.
    a. Sufficient motor torque and spring torque to drive damper fully closed with adequate force to achieve required damper seal.
    b. Minimum 90-degree drive rotation.
4. Clockwise or counterclockwise drive rotation as required for application.
5. Environmental Operating Range:
    a. Temperature: Minus 40 to plus 130 deg F.
    b. Humidity: 5 to 95 percent relative humidity noncondensing.
6. Environmental Enclosure: NEMA 2.
7. Actuator to be factory mounted and provided with a single-point wiring connection.

K. Controllers, Electrical Devices, and Wiring:

1. Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
2. Electrical Connection: 24 V, 60 Hz.

L. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Chain pulls.
4. 90-degree stops.

2.3 BAROMETRIC RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Or approved equal.

B. General Requirements:

1. Suitable for horizontal or vertical mounting.

2. Maximum Air Velocity: 1000 fpm .
3. Maximum System Pressure: 2 inches wg.

C. Construction:

1. Frame: Hat shaped, 16-gauge- thick, galvanized sheet steel , with welded corners or mechanically attached.
2. Blades:

    a. Multiple, 16-gauge- thick, galvanized sheet steel .
    b. Maximum Width: 6 inches.
    c. Action: Parallel.
    d. Balance: Gravity.
    e. Eccentrically pivoted.

3. Blade Seals: Neoprene.
4. Blade Axles: Galvanized steel.
5. Tie Bars and Brackets:

    a. Material: Aluminum.
    b. Rattle free with 90-degree stop.

6. Bearings: Synthetic.

D. Pressure Adjustment: Return spring or counter weight with adjustable tension.

E. Accessories:

1. Flange on intake.
2. Adjustment device to permit setting for varying differential static pressures.

2.4 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Greenheck Fan Corporation.
    b. Pottorff.
    c. Ruskin Company.
    d. Or approved equal.

2. Performance:

    a. Leakage Rating Class III: Leakage not exceeding 40 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Construction:

a. Linkage out of airstream.
b. Suitable for horizontal or vertical airflow applications.

4. Frames:

a. Hat-shaped, 16-gauge- thick, galvanized sheet steel.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized steel; 16 gauge thick.

6. Blade Axles: Galvanized steel.
7. Bearings:

a. Oil-impregnated bronze .
b. Dampers mounted with vertical blades to have thrust bearing at each end of every blade.

8. Tie Bars and Brackets: Galvanized steel.
9. Locking device to hold damper blades in a fixed position without vibration.

B. Standard, Aluminum, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Nailor Industries Inc.
b. Pottorff.
c. Ruskin Company.
d. Or approved equal.

2. Performance:

a. Leakage Rating Class III: Leakage not exceeding 40 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Construction:

a. Linkage out of airstream.
b. Suitable for horizontal or vertical airflow applications.

4. Frames:

a. Hat-shaped, 0.10-inch- thick, aluminum sheet channels.
b. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.
    c. Stiffen damper blades for stability.
    d. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.

6. Blade Axles: Galvanized steel .
7. Bearings:

    a. Oil-impregnated bronze .
    b. Dampers mounted with vertical blades to have thrust bearing at each end of every blade.

8. Tie Bars and Brackets: Aluminum.
9. Locking device to hold damper blades in a fixed position without vibration.

C. Low-Leakage, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Greenheck Fan Corporation.
    b. Pottorff.
    c. Ruskin Company.
    d. Or approved equal.

2. Performance:

    a. AMCA Certification: Test and rate in accordance with AMCA 511.
    b. Leakage:

        1) Class IA: Leakage must not exceed 3 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Construction:

    a. Linkage: Out of airstream.
    b. Suitable for horizontal or vertical airflow applications.

4. Frames:

    a. Hat, U, or angle shaped.
    b. Thickness: 16-gauge galvanized sheet steel.
    c. Mitered and welded corners.
    d. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.

c. Stiffen damper blades for stability.
d. Galvanized, roll-formed steel; 16 gauge thick.

6. Blade Jamb Seals: Neoprene.
7. Blade Axles: Galvanized steel.
8. Bearings:

a. Oil-impregnated bronze.
b. Dampers mounted with vertical blades to have thrust bearing at each end of every blade.

9. Tie Bars and Brackets: Galvanized steel.
10. Locking device to hold damper blades in a fixed position without vibration.

D. Low-Leakage, Aluminum, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Nailor Industries Inc.
b. Pottorff.
c. Ruskin Company.
d. Or approved equal.

2. Performance:

a. AMCA Certification: Test and rate in accordance with AMCA 511.
b. Leakage:

1) Class IA: Leakage must not exceed 3 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Construction:

a. Linkage out of airstream.
b. Suitable for horizontal or vertical airflow applications.

4. Frames:

a. Hat, U, or angle shaped.
b. Thickness: 0.08-inch aluminum sheet channels.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Roll-Formed Aluminum Blades:0.072-inch thick aluminum sheet.

6. Blade Jamb Seals: Neoprene.
7. Blade Axles: Stainless steel.
8. Bearings:

a. Dampers mounted with vertical blades to have thrust bearings at each end of every blade.

9. Tie Bars and Brackets: Aluminum.
10. Locking device to hold damper blades in a fixed position without vibration.

E. Jackshaft:

1. Size: 0.5-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

F. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle, made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.5 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Or approved equal.

B. General Requirements:

1. Unless otherwise indicated, use parallel-blade configuration for two-position control, equipment isolation service, and when mixing two airstreams. For other applications, use opposed-blade configuration.
2. Factory or field assemble multiple damper sections to provide a single damper assembly of size required by the application.

C. Performance:

1. AMCA Certification: Test and rate in accordance with AMCA 511.
2. Leakage:

a. Class I: Leakage must not exceed 4 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Pressure Drop: 0.05 inch wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500-D, Figure 5.3.
4. Velocity: Up to 2000 fpm.
5. Temperature: Minus 25 to plus 180 deg F.

6. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length.

D. Construction:

1. Linkage out of airstream.
2. Suitable for horizontal or vertical airflow applications.
3. Frames:

    a. Hat, U, or angle shaped.
    b. 16-gauge- thick, galvanized sheet steel.
    c. Interlocking, gusseted corners.
    d. Flanges for attaching to walls and flangeless frames for installing in ducts.

4. Blades:

    a. Multiple blade with maximum blade width of 6 inches.
    b. Parallel Opposed-blade design.
    c. 16-gauge- thick single skin.

5. Blade Edging Seals:

    a. Replaceable Closed-cell neoprene.

6. Blade Jamb Seal: Flexible stainless steel, compression type.
7. Blade Axles: 1/2-inch diameter; galvanized steel.
8. Blade-Linkage Hardware: Zinc-plated steel and brass; ends sealed against blade bearings. Linkage mounted out of air stream.
9. Bearings:

    a. Dampers mounted with vertical blades to have thrust bearings at each end of every blade.

E. Damper Actuator - Electric:

1. Electric - 24 V ac.
2. UL 873, plenum rated.
3. Two position Fully modulating.

    a. Sufficient motor torque to drive damper fully open and fully closed with adequate force to achieve required damper seal.
    b. Minimum 90-degree drive rotation.

4. Clockwise or counterclockwise drive rotation as required for application.
5. Environmental Operating Range:

    a. Temperature: Minus 40 to plus 130 deg F.
    b. Humidity: 5 to 95 percent relative humidity noncondensing.

6. Environmental enclosure: NEMA 2.
7. Actuator to be factory mounted and provided with a single-point wiring connection.

F. Controllers, Electrical Devices, and Wiring:

1. Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
2. Electrical Connection: 24 V, 60 Hz .

2.6 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Or approved equal.

B. Type: Static ; rated and labeled in accordance with UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000 fpm velocity.

D. Fire Rating: 1-1/2 hours.

E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed galvanized steel; with mitered and interlocking corners; gauge in accordance with UL listing.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel; gauge in accordance with UL listing.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed galvanized sheet steel, interlocking. Material gauge is to be in accordance with UL listing.

I. Horizontal Dampers: Include blade lock and stainless steel closure spring.

J. Heat-Responsive Device:

1. Resettable link and switch package, factory installed, 165 deg F rated.

2.7 CEILING RADIATION DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Or approved equal.

B. General Requirements:

1. Labeled according to UL 555C by an NRTL.
2. Comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."

C. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction; gauge in accordance with UL listing.

D. Blades: Galvanized sheet steel with refractory insulation; gauge in accordance with UL listing.

E. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

F. Fire Rating: 1 or 2 hour(s).

2.8 SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Or approved equal.

B. General Requirements:

1. Label to indicate conformance to UL 555 and UL 555S by an NRTL.
2. Label to indicate conformance to NFPA 80 and NFPA 90A by an NRTL.
3. Unless otherwise indicated, use parallel-blade configuration.
4. Factory or field assemble multiple damper sections to provide a single damper assembly of size required by the application.
5. Factory install damper actuator by damper manufacturer as integral part of damper assembly. Coordinate actuator location, mounting, and electrical requirements with damper manufacturer.

C. Performance:

1. AMCA Certification: Test and rate in accordance with AMCA Publication 511.
2. Leakage:

    a. Class I: Leakage must not exceed 4 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Pressure Drop: 0.05 inch wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500-D, Figure 5.3.
4. Velocity: Up to 2000 fpm.
5. Temperature: Minus 25 to plus 180 deg F.
6. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length.

D. Construction:

1. Suitable for horizontal or vertical airflow applications.
2. Linkage out of airstream.
3. Frame:

    a. Hat shaped.
    b. Galvanized sheet steel, with welded interlocking, gusseted corners.
    c. Gauge in accordance with UL listing.

4. Blades:

    a. Roll-formed, horizontal, airfoil, galvanized sheet steel.
    b. Maximum width and gauge in accordance with UL listing.

5. Blade Edging Seals:

    a. Silicone rubber.

6. Blade Jamb Seal: Flexible stainless steel, compression type.
7. Blade Axles: 1/2-inch diameter; galvanized steel ; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings. Linkage is to be mounted out of airstream.
8. Bearings:

    a. Oil-impregnated bronze.

E. Mounting Sleeve: Factory-installed, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone caulking; gauge in accordance with UL listing.

F. Damper Actuator - Electric:

1. Electric - 24 V ac.
2. UL 873, plenum rated.
3. Designed to operate in smoke-control systems complying with UL 555S requirements.
4. Two position or Fully modulating with fail-safe spring return.

    a. Sufficient motor torque and spring torque to drive damper fully open and fully closed with adequate force to achieve required damper seal.
    b. Maximum 15-second full-stroke closure.
    c. Minimum 90-degree drive rotation.

5. Clockwise or counterclockwise drive rotation as required for application.
6. Environmental Operating Range:

    a. Temperature: Minus 40 to plus 130 deg F.
    b. Humidity: 5 to 95 percent relative humidity noncondensing.

7. Environmental Enclosure: NEMA 2.
8. Actuator to be factory mounted and provided with single-point wiring connection.

G. Controllers, Electrical Devices, and Wiring:

1. Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
2. Electrical Connection: 24 V, 60 Hz.

H. Accessories:

1. Auxiliary switches for signaling fan control or position indication.
2. Momentary test switch , damper or remote mounted.
3. Smoke Detector: Integral, factory wired for single-point connection.

2.9 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Pottorff.
3. Ruskin Company.
4. Or approved equal.

B. General Requirements:

1. Label to indicate conformance to UL 555 and UL 555S by an NRTL.
2. Label to indicate conformance to NFPA 80 and NFPA 90A by an NRTL.
3. Unless otherwise indicated, use parallel-blade configuration.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000 fpm velocity.

D. Fire Rating: 1-1/2 hours.

E. Performance:

1. AMCA Certification: Test and rate in accordance with AMCE Publication 511.
2. Leakage:

   a. Class I: Leakage must not exceed 4 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Pressure Drop: 0.05 in. wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500-D, Figure 5.3.
4. Velocity: Up to 2000 fpm.
5. Temperature: Minus 25 to plus 180 deg F.
6. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length.

F. Construction:

1. Suitable or horizontal or vertical airflow applications.
2. Linkage out of airstream.
3. Frame:

a. Hat shaped.
b. Galvanized sheet steel, with welded interlocking, gusseted corners.
c. Gauge is to be in accordance with UL listing.

4. Blades:

a. Roll-formed, horizontal, airfoil, galvanized sheet steel.
b. Maximum width and gauge in accordance with UL listing.

5. Blade Edging Seals:

a. Silicone rubber.

6. Blade Jamb Seal: Flexible stainless steel, compression type.
7. Blade Axles: 1/2-inch- diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings. Linkage mounted out of airstream.
8. Bearings:

a. Oil-impregnated bronze.

G. Mounting Sleeve:

1. Factory installed, galvanized sheet steel.
2. Length to suit wall or floor application with factory-furnished silicone caulking.
3. Gauge in accordance with UL listing.

H. Heat-Responsive Device:

1. Resettable, 165 deg F rated, fire-closure device.
2. Electric resettable device and switch package, factory installed, rated.

I. Master control panel for use in dynamic smoke-management systems.

J. Damper Actuator - Electric:

1. Electric - 24 V ac.
2. UL 873, plenum rated.
3. Designed to operate in smoke-control systems complying with UL 555S requirements.
4. Two position or Fully modulating with fail-safe spring return.

a. Sufficient motor torque and spring torque to drive damper fully open and fully closed with adequate force to achieve required damper seal.
b. Maximum 15-second full-stroke closure.
c. Minimum 90-degree drive rotation.

5. Clockwise or counterclockwise drive rotation as required for application.
6. Environmental Operating Range:

a. Temperature: Minus 40 to plus 130 deg F.

b. Humidity: 5 to 95 percent relative humidity noncondensing.

7. Environmental Enclosure: NEMA 2.
8. Actuator to be factory mounted and provided with single-point wiring connection.

K. Controllers, Electrical Devices, and Wiring:

1. Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
2. Electrical Connection: 24 V, 60 Hz.

L. Accessories:

1. Auxiliary switches for signaling fan control or position indication.
2. Momentary test switch , damper or remote mounted.
3. Smoke Detector: Integral, factory wired for single-point connection.

2.10 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. DynAir; a Carlisle Company.
3. Elgen Manufacturing.
4. Ward Industries; a brand of Hart & Cooley, Inc.
5. Or approved equal.

B. Description: Add-on , factory fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gauge and Shape: Match connecting ductwork.

2.11 DUCT SILENCERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. IAC Acoustics; a division of Sound Seal.
3. Metal Form Mfg/Commercial Acoustics.
4. Pottorff.
5. Price Industries.
6. Ruskin Company.
7. Vibro-Acoustics.
8. Or approved equal.

B. General Requirements:

1. Factory fabricated.

2. Fire-Performance Characteristics: Adhesives, sealants, packing materials, and accessory materials must have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested in accordance with ASTM E84.
3. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.
4. Bearing AMCA's Certified Ratings Seal for prefabricated silencer sound and air performance.

C. Shape:

1. Rectangular straight with splitters or baffles.
2. Round straight with center bodies or pods.
3. Rectangular elbow with splitters or baffles.
4. Round elbow with center bodies or pods.
5. Rectangular transitional with splitters or baffles.

D. Rectangular Silencer Outer Casing: ASTM A653/A653M, G90, galvanized sheet steel, 0.034 inch thick.

E. Round Silencer Outer Casing: ASTM A653/A653M, G90, galvanized sheet steel.

1. Sheet Metal Thickness for Units up to 24 Inches in Diameter: 22 gauge thick.
2. Sheet Metal Thickness for Units 26 through 40 Inches in Diameter: 20 gauge thick.
3. Sheet Metal Thickness for Units 42 through 52 Inches in Diameter: 18 gauge thick.
4. Sheet Metal Thickness for Units 54 through 60 Inches in Diameter: 16 gauge thick.

F. Inner Casing and Baffles: ASTM A653/A653M, G90 galvanized sheet metal, 22 gauge thick, and with 1/8-inch- diameter perforations.

G. Special Construction:

1. Suitable for outdoor use.
2. High transmission loss to achieve STC 45.

H. Connection Sizes: Match connecting ductwork unless otherwise indicated.

I. Principal Sound-Absorbing Mechanism:

1. Controlled impedance membranes and broadly tuned resonators without absorptive media.
2. Dissipative type with fill material.

    a. Fill Material: Inert and vermin-proof fibrous material, packed under not less than 15 percent compression.
    b. Erosion Barrier: Polymer bag enclosing fill, heat-sealed before assembly.

3. Lining: None .

J. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations. Do not use mechanical fasteners for unit assemblies.

1. Joints: Lock formed and sealed.

2. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
3. Reinforcement: Cross or trapeze angles for rigid suspension.

K. Source Quality Control:

1. Test in accordance with ASTM E477.
2. Testing to be witnessed by Commissioner.
3. Record acoustic ratings, including dynamic insertion loss and generated-noise power levels with an airflow of at least 2000 fpm face velocity.
4. Leak Test: Test units for airtightness at 200 percent of associated fan static pressure or 6-inch wg static pressure, whichever is greater.

L. Capacities and Characteristics:

1. Configuration: Straight.
2. Shape: Rectangular.
3. Attenuation Mechanism: Acoustical glass fiber with protective film liner.
4. Maximum Pressure Drop: 0.35 inch wg.
5. Casing:

    a. Attenuation: Standard.
    b. Outer Material: Galvanized steel.
    c. Inner Material: Aluminum.

6. End Connection: 1-inch slip joint.
7. Length: 36 inches.
8. Face Velocity: 1500 fpm.
9. Accessories:

    a. Access door.
    b. Birdscreen.

2.12 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aero-Dyne Sound Control Co.
2. Ductmate Industries, Inc.
3. Duro Dyne Inc.
4. DynAir; a Carlisle Company.
5. Elgen Manufacturing.
6. Ward Industries; a brand of Hart & Cooley, Inc.
7. Or approved equal.

B. Manufactured Turning Vanes for Metal Ducts: Fabricate curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

E. Vane Construction:

1. Single wall.

2.13 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. DynAir; a Carlisle Company.
2. METALAIRE, Inc.
3. United Enertech.
4. Young Regulator Company.
5. Or approved equal.

B. Description: Cable system designed for remote manual damper adjustment.

C. Tubing: Copper.

D. Cable: Stainless steel.

E. Wall-Box Mounting: Recessed .

F. Wall-Box Cover-Plate Material: Stainless steel.

2.14 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Elgen Manufacturing.
4. Flexmaster U.S.A., Inc.
5. Ruskin Company.
6. Ward Industries; a brand of Hart & Cooley, Inc.
7. Or approved equal.

B. Duct-Mounted Access Doors: Fabricate access panels in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figure 7-2 (7-2M), "Duct Access Doors and Panels," and Figure 7-3, "Access Doors - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. 24-gauge- thick galvanized steel door panel.
d. Vision panel.
e. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
f. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

a. 24-gauge- thick galvanized steel or 0.032-inch- thick aluminum frame.

3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.

a. 24-gauge- thick galvanized steel door panel.

2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set at 3.0 to 8.0 inches wg.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.15 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CL WARD & Family Inc.
2. Ductmate Industries, Inc.
3. Flame Gard, Inc.

4. Or approved equal.

B. Access panels used in cooking applications:

1. Labeled compliant to NFPA 96 for grease duct access doors.
2. Labeled in accordance with UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 16-gauge stainless steel.

D. Fasteners: Stainless steel. Panel fasteners must not penetrate duct wall.

E. Gasket: Comply with NFPA 96, grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

F. Minimum Pressure Rating: 10 inches wg positive or negative.

2.16 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. DynAir; a Carlisle Company.
4. Elgen Manufacturing.
5. Ward Industries; a brand of Hart & Cooley, Inc.
6. Or approved equal.

B. Fire-Performance Characteristics: Adhesives, sealants, fabric materials, and accessory materials must have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested in accordance with ASTM E84.

C. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.

D. Materials: Flame-retardant or noncombustible fabrics.

E. Coatings and Adhesives: Comply with UL 181, Class 1.

F. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

G. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

H. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

I. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

J. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.17 DUCT ACCESSORY HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CL WARD & Family Inc.
2. Ductmate Industries, Inc.
3. Duro Dyne Inc.
4. DynAir; a Carlisle Company.
5. Elgen Manufacturing.
6. Ward Industries; a brand of Hart & Cooley, Inc.

B. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

C. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

2.18 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G60.
2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless Steel Sheets: Comply with ASTM A480/A480M, Type 304, and having a No. 2 finish for concealed ducts.

C. Aluminum Sheets: Comply with ASTM B209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, one-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install duct accessories in accordance with applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116 for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless steel accessories in stainless steel ducts, and aluminum accessories in aluminum ducts.

C. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Where multiple damper sections are necessary to achieve required dimensions, provide reinforcement to fully support damper assembly when fully closed at full system design static pressure.

E. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

F. Set dampers to fully open position before testing, adjusting, and balancing.

G. Install test holes at fan inlets and outlets and elsewhere as indicated and as needed for testing and balancing.

H. Install fire and smoke dampers in accordance with UL listing.

I. Connect ducts to duct silencers with flexible duct connectors.

J. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream and downstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links must be pressure relief access doors and must be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-ft. spacing.
8. Upstream and downstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. For grease ducts, install at locations and spacing as required by NFPA 96.
11. Control devices requiring inspection.
12. Elsewhere as indicated.

K. Install access doors with swing against duct static pressure.

L. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

M. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

N. Install flexible connectors to connect ducts to equipment.

O. For fans developing static pressures of 5 inches wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

P. Install duct test holes where required for testing and balancing purposes.

Q. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors, and verify that size and location of access doors are adequate to perform required operation.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation, and verify that vanes do not move or rattle.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 233346 - FLEXIBLE DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Non-insulated flexible ducts.
2. Insulated flexible ducts.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For flexible ducts.

1. Include plans showing locations and mounting and attachment details.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from installers of the items involved.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials must be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

C. Comply with the Air Diffusion Council's "ADC Flexible Air Duct Test Code FD 72-R1."

D. Comply with ASTM E 96/E 96M, "Test Methods for Water Vapor Transmission of Materials."

2.2 NON-INSULATED FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Thermaflex; a Flex-Tek Group company.
4. Ward Industries; a brand of Hart & Cooley, Inc.
5. Or approved equal.

B. Non-Insulated, Flexible Duct: UL 181, Class 1, two-ply vinyl film supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.

2.3 INSULATED FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Thermaflex; a Flex-Tek Group company.
4. Ward Industries; a brand of Hart & Cooley, Inc.
5. Or approved equal.

B. Insulated, Flexible Duct: UL 181, Class 1, two-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.

2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.
4. Insulation R-Value: Comply with ASHRAE/IES 90.1, R-8.

2.4 FLEXIBLE DUCT CONNECTORS

A. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.

B. Non-Clamp Connectors: Liquid adhesive plus tape.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install flexible ducts according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install in indoor applications only. Flexible ductwork should not be exposed to UV lighting.

C. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

D. Connect diffusers or light troffer boots to ducts directly or with maximum 36 lengths of flexible duct clamped or strapped in place.

E. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

F. Install duct test holes where required for testing and balancing purposes.

G. Installation:

1. Install ducts fully extended.
2. Do not bend ducts across sharp corners.
3. Bends of flexible ducting must not exceed a minimum of one duct diameter.
4. Avoid contact with metal fixtures, water lines, pipes, or conduits.
5. Install flexible ducts in a direct line, without sags, twists, or turns.

H. Supporting Flexible Ducts:

1. Suspend flexible ducts with bands 1-1/2 inches wide or wider and spaced a maximum of 48 inches apart. Maximum centerline sag between supports must not exceed 1/2 inch per 12 inches.

2. Install extra supports at bends placed approximately one duct diameter from center line of the bend.
3. Ducts may rest on ceiling joists or truss supports. Spacing between supports must not exceed the maximum spacing per manufacturer's written installation instructions.
4. Vertically installed ducts must be stabilized by support straps at a maximum of 72 inches o.c.

END OF SECTION 233346

SECTION 233413 - AXIAL HVAC FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Vaneaxial fans.
2. Mixed-flow fans.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
2. Include rated capacities, furnished specialties, and accessories for each fan.
3. Fans:

    a. Certified fan performance curves with system operating conditions indicated.
    b. Certified fan sound-power ratings.
    c. Fan construction and accessories.
    d. Motor ratings and electrical characteristics, plus motor and electrical accessories.
    e. Fan speed controllers.

4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

C. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.

2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

D. Engineering Services: Submittal: For vibration isolation, supports, indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1. Design Calculations: Calculate requirements for selecting vibration isolators, supports, and for designing vibration isolation bases.

E. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for fans, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Startup service reports.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fans, include the following:

1. Operation in normal and emergency modes.
2. Operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of unit components.

C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

E. Engineering Services: Engage a qualified professional engineer licensed in the State of New York as defined DDC General Conditions, to design vibration isolation, supports, including comprehensive engineering analysis, using performance requirements and design criteria indicated.

2.2 VANEAXIAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aerovent; a division of Twin City Fan Companies, Ltd.
2. American Fan Company.
3. Chicago Blower Corporation.
4. Cincinnati Fan.
5. Howden.
6. Loren Cook Company.
7. New York Blower Company (The).
8. Peerless Blowers.
9. PennBarry.
10. Or approved equal.

B. Source Limitations: Obtain vaneaxial fans from single manufacturer.

C. Description: Fan wheel and housing, straightening vane section, factory-mounted motor with belt or direct drive, an inlet cone section, and accessories.

1. Variable-Pitch Fans: Internally mounted electronic actuator, externally mounted positive positioner, and mechanical-blade-pitch indicator.

D. Housings: Steel.

1. Inlet and Outlet Connections: Flanges.
2. Guide Vane Section: Integral guide vanes downstream from fan wheel designed to straighten airflow.

E. Wheel Assemblies: Cast aluminum with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key.

F. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

1. Service Factor Based on Fan Motor Size: 1.2.
2. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
3. Fan Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
7. Motor Base: Adjustable rail mount motor base with adjustment screw to set belt tension.
8. Shaft Bearings: Radial, self-aligning bearings.

    a. Ball-Bearing Rating Life: ABMA 9, L10 of 100,000 hours.
    b. Extend lubrication lines to outside of casing and terminate with grease fittings.

G. Accessories:

1. Companion Flanges: Rolled flanges of same material as housing.
2. Inspection Door: Bolted door allowing limited access to internal parts of fan, of same material as housing.
3. Propeller Access Section Door: Short duct section bolted to fan inlet and outlet allowing access to internal parts of fan for inspection and cleaning, of same material as housing.
4. Swingout Construction: Assembly allowing entire fan section to swing out from duct for cleaning and servicing, of same material as housing.
5. Mounting Clips: Horizontal ceiling or Vertical mounting clips welded to fan housing, of same material as housing.
6. Horizontal Support: Pair of supports bolted to fan housing, of same material as housing.
7. Vertical Support: Short duct section with welded brackets bolted to fan housing, of same material as housing.
8. Inlet Screen: On unducted fan inlet - wire-mesh screen, of same material as housing.
9. Outlet Screen: On unducted fan outlet - wire-mesh screen, of same material as housing.
10. Backdraft Dampers: Butterfly style, for mounting with flexible connection to fan discharge or direct mounted to discharge diffuser section, of same material as housing.
11. Stall Alarm Probe: Sensing probe capable of detecting fan operation in stall and signaling control devices. Control devices and sequence of operation are specified in Section 230923.23 "Pressure Instruments" and Section 230993.11 "Sequence of Operations for HVAC DDC."
12. Flow Measurement Port: Pressure measurement taps installed in fan inlet to detect and signal airflow readings to temperature-control systems. Control devices and sequence of operation are specified in Section 230923.14 "Flow Instruments" and Section 230993.11 "Sequence of Operations for HVAC DDC."
13. Shaft Seal: Elastomeric seal and PTFE wear plate, suitable for up to 300 deg F.
14. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.
15. Inlet Bell: Curved inlet for when fan is not attached to duct, of same material as housing.

16. Inlet Cone: Round-to-round transition, of same material as housing.
17. Outlet Cone: Round-to-round transition, of same material as housing.
18. Stack Cap: Vertical discharge assembly with backdraft dampers, of same material as housing.
19. Direct-Driven Units: Encase motor in housing outside of airstream. Extend lubrication lines to outside of casing and terminate with grease fittings.
20. Factory-wired motor disconnect switch located on outside of fan housing.

H. Factory Finishes:

1. Sheet Metal Parts: Prime coat before final assembly.
2. Exterior Surfaces: Baked-enamel finish coat after assembly.
3. Coatings: Powder-baked enamel; .

    a. Apply to finished housings.
    b. Apply to fan wheels.

2.3 MIXED-FLOW FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Howden.
3. Loren Cook Company.
4. Twin City
5. Or approved equal.

B. Source Limitations: Obtain mixed-flow fans from single manufacturer.

C. Description: Fan wheel and housing, straightening vane section, factory-mounted motor with belt drive, and accessories.

D. Housings: Galvanized steel.

1. Inlet and Outlet Connections: Outer mounting frame and companion flanges.
2. Guide Vane Section: Integral guide vanes downstream from fan wheel designed to straighten airflow.
3. Mixed-Flow Outlet Connection: One flanged discharge(s) perpendicular to fan inlet.

E. Wheel Assemblies: Cast aluminum with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key.

F. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

1. Service Factor Based on Fan Motor Size: 1.5.
2. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
3. Fan Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.

5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Motor Base: Adjustable rail mount motor base with adjustment screw to set belt tension.
7. Shaft Bearings: Radial, self-aligning bearings.

    a. Ball-Bearing Rating Life: ABMA 9, L10 of 100,000 hours.
    b. Extend lubrication lines to outside of casing and terminate with grease fittings.

G. Accessories:

1. Mounting Clips: Horizontal ceiling clips welded to fan housing, of same material as housing.
2. Inlet and Outlet Screens: On unducted fan inlet and outlet - wire-mesh screen, of same material as housing.
3. Backdraft Dampers: Butterfly style, for mounting with flexible connection to fan discharge or direct mounted to discharge diffuser section, of same material as housing.
4. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.
5. Inlet Bell: Curved inlet for when fan is not attached to duct, of same material as housing.
6. Inlet Cones: Round-to-round transition, of same material as housing.
7. Outlet Cones: Round-to-round transition, of same material as housing.
8. Stack Cap: Vertical discharge assembly with backdraft dampers, of same material as housing.
9. Direct-Driven Units: Encase motor in housing outside of airstream.
10. Factory-wired motor disconnect switch located on outside of fan housing.

H. Factory Finishes:

1. Sheet Metal Parts: Prime coat before final assembly.
2. Exterior Surfaces: Baked-enamel finish coat after assembly.
3. Coatings: Powder-baked enamel; .

    a. Apply to finished housings.
    b. Apply to fan wheels.

2.4 SOURCE QUALITY CONTROL

A. AMCA Certification for Fan Sound Performance Rating: Test, rate, and label in accordance with AMCA 311.

B. AMCA Certification for Fan Energy Index (FEI): Test, rate, and label in accordance with AMCA 211.

C. Fan Operating Limits: Classify fans in accordance with AMCA 99, Section 14.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Install axial fans level and plumb.

B. Disassemble and reassemble units, as required for moving to the final location, in accordance with manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

D. Equipment Mounting:

1. Install floor-mounted axial fans on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Unit Support: Install axial fans level on structural curbs. Coordinate with duct connections. Secure units to structural support with anchor bolts.
3. Support duct-mounted and other hanging axial fans directly from the building structure, using suitable hanging systems as specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
4. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

E. Install units with adequate clearances for service and maintenance.

F. Label fans in accordance with requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.3 DUCTWORK CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Where installing ducts adjacent to fans, allow space for service and maintenance.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.6 STARTUP SERVICE:

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Verify that shipping, blocking, and bracing are removed.
3. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
4. Verify that cleaning and adjusting are complete.
5. For direct-drive fans, verify proper motor rotation direction and verify fan wheel free rotation and smooth bearing operation.
6. For belt-drive fans, disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
7. Adjust belt tension.
8. Adjust damper linkages for proper damper operation.
9. Verify lubrication for bearings and other moving parts.
10. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
11. Disable automatic temperature-control operators, energize motor and confirm proper motor rotation and unit operation, adjust fan to indicated rpm, and measure and record motor voltage and amperage.
12. Shut unit down and reconnect automatic temperature-control operators.
13. Remove and replace malfunctioning units and retest as specified above.

3.7 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Lubricate bearings.

D. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.8 CLEANING

A. After completing system installation and testing, adjusting, and balancing and after completing startup service, clean fans internally to remove foreign material and construction dirt and dust.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and inspections:

1. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Test and adjust controls and safeties.
3. Fans and components will be considered defective if they do not pass tests and inspections.
4. Prepare test and inspection reports.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate axial HVAC fans.

END OF SECTION 233413

SECTION 233600 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Modulating, single-duct air terminal units.
2. Parallel fan-powered air terminal units.
3. Series fan-powered air terminal units.
4. Casing liner.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of air terminal unit.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for air terminal units.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product data showing compliance with ASHRAE 62.1.

C. Shop Drawings: For air terminal units.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

4. Hangers and supports, including methods for duct and building attachment and vibration isolation.

D. Engineering Services Submittal: For vibration isolation and supports, indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1. Materials, fabrication, assembly, and spacing of hangers and supports.
2. Design Calculations: Calculate requirements for selecting vibration isolators, supports,.

E. Coordination Drawings: Floor plans and other details, or BIM model, drawn to scale, indicating the items described in this Section, and coordinated with all building trades.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals.

1. In addition to requirements of DDC General Conditions, include the following:

a. Instructions for resetting minimum and maximum air volumes.
b. Instructions for adjusting software set points.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a Qualified Electrical Testing Laboratory, and marked for intended location and application.

B. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, "Section 6 - Heating, Ventilating, and Air Conditioning."

D. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York as defined in DDC General Conditions, to design vibration isolation, supports,, including comprehensive engineering analysis, using performance requirements and design criteria indicated.

2.2 MODULATING, SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Krueger-HVAC, a division of Air System Components; Johnson Controls, Inc.
3. Nailor Industries Inc.
4. Price Industries.
5. Titus, a division of Air System Components; Johnson Controls, Inc.
6. Tuttle & Bailey, a division of Air System Components; Johnson Controls, Inc.
7. Or approved equal.

B. Description: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: Minimum 20-gauge- thick galvanized steel.

1. Casing Liner: Comply with requirements in "Casing Liner" Article below for "Casing Liner, Fibrous Glass" Paragraph or "Casing Liner, Flexible Elastomeric" Paragraph.
2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections, size matching inlet size.
4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: AHRI 880 rated, 1 percent of nominal airflow at 3-inch w.g. inlet static pressure.

E. Velocity Sensors: Multipoint array with velocity inlet sensors.

F. Attenuator Section: Casing material and thickness matching associated air terminal unit casing. Provide absorptive attenuator integral with the air terminal unit, with noise transmission loss performance as required in schedules on Drawings.

G. Hydronic Heating Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch. Include manual air vent and drain valve. Provide hydronic heating coils for air terminal units scheduled on Drawings.

H. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless steel, machine-staked terminals secured with stainless steel hardware. Provide electric-resistance heating coils for air terminal units scheduled on Drawings.

1. Stage(s): Two.
2. Access door interlocked disconnect switch.
3. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable).
4. Nickel chrome 80/20 heating elements.
5. Airflow switch for proof of airflow.
6. Fan interlock contacts.
7. Fuses in terminal box for overcurrent protection (for coils of more than 48 A).
8. Pneumatic-electric switches and relays.

9. Magnetic contactor for each step of control (for three-phase coils).

I. Electric Controls:

1. Electric Damper Actuator: 24 V, fail in last position.
2. Electric Thermostat: Wall-mounted electronic type with clock display, temperature display in Fahrenheit and Celsius, and space temperature set point.
3. Air Volume Controls: Pressure-dependent volume controls with field-adjustable minimum and maximum position stops.

J. Electronic Controls:

1. Electronic Damper Actuator: 24 V, fail in last position.
2. Electronic Thermostat: Wall-mounted electronic type with temperature set-point display in Fahrenheit and Celsius.
3. Electronic Air Volume Controller: Pressure-independent analog electronic controller, factory calibrated and field adjustable to minimum and maximum air volumes; provides consistent airflow to the space in response to electronic thermostat signal while compensating for inlet static-pressure variations of up to 4 inches wg; includes a multipoint velocity sensor at air inlet.

K. Direct Digital Controls:

1. Terminal Unit Controller: Pressure-independent, VAV controller and integrated actuator, and electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes.

    a. Occupied and unoccupied operating mode.
    b. Remote reset of airflow or temperature set points.
    c. Adjusting and monitoring with portable terminal.
    d. Communication with temperature-control system specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."

2. Room Sensor: Wall mounted with temperature set-point adjustment and access for connection of portable operator terminal.
3. Temperature sensors in front-of-house spaces must be non-indicating and non-adjustable.
4. Temperature sensors in back-of-house spaces must be indicated and adjustable.

L. Control Sequence: See Section 230993.11 "Sequence of Operation for HVAC" for control sequences.

2.3 SERIES FAN-POWERED AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Krueger-HVAC, a division of Air System Components; Johnson Controls, Inc.
3. Nailor Industries Inc.
4. Price Industries.
5. Titus, a division of Air System Components; Johnson Controls, Inc.
6. Tuttle & Bailey, a division of Air System Components; Johnson Controls, Inc.

7. Or approved equal.

B. Description: Volume-damper assembly and centrifugal fan in series arrangement inside unit casing with control components inside a protective metal shroud.

1. Designed for quiet operation.
2. Low-profile design.

C. Casing: Minimum 20-gauge- thick galvanized steel.

1. Casing Liner: Comply with requirements in "Casing Liner" Article below for "Casing Liner, Fibrous Glass" Paragraph or "Casing Liner, Flexible Elastomeric" Paragraph.
2. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections.
4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
5. Fan: Forward-curved centrifugal.

D. Volume Damper: Galvanized steel with flow-sensing ring and peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: AHRI 880 rated, 1 percent of nominal airflow at 3-inch w.g. inlet static pressure.

E. Velocity Sensors: Multipoint array with velocity sensors in air inlet.

F. Fan Motor:

1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Type: Electronically commutated motor.
3. Fan-Motor Assembly Isolation: Rubber isolators.
4. Enclosure: Totally enclosed, fan cooled.
5. Enclosure Materials: Cast iron.
6. Motor Speed: Variable speed.

    a. Speed Control: Infinitely adjustable with pneumatic-electric and electronic controls.

G. Filters:

1. Polyurethane Foam: MERV 8. Minimum efficiency reporting value and average arrestance in accordance with ASHRAE 52.2.

H. Attenuator Section: Casing material and thickness matching associated air terminal unit casing. Provide absorptive attenuator integral with the plenum inlet of the air terminal unit, of noise transmission loss performance as required in schedules on Drawings.

I. Hydronic Heating Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.08 inch. Include manual air vent and drain valve. Locate coil in discharge outlet airstream. Provide hydronic heating coils for air terminal units scheduled on Drawings.

J. Factory-Mounted and -Wired Controls: Electrical components mounted in control box with removable cover. Incorporate single-point electrical connection to power source.

1. Control Transformer: Factory mounted for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
2. Wiring Terminations: Fan and controls to terminal strip. Terminal lugs to match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized in accordance with NFPA 70.
3. Disconnect Switch: Factory-mounted fuse type.

K. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.

L. Electric Controls:

1. Electric Damper Actuator: 24 V, fail in last position.
2. Electric Thermostat: Wall-mounted electronic type with clock display, temperature display in Fahrenheit and Celsius, and space temperature set point.
3. Air Volume Controls: Pressure-dependent volume controls with field-adjustable minimum and maximum position stops.

M. Electronic Controls:

1. Electronic Damper Actuator: 24 V, fail in last position.
2. Electronic Thermostat: Wall-mounted electronic type with temperature display in Fahrenheit and Celsius.
3. Electronic Air Volume Controller: Pressure-independent analog electronic controller, factory calibrated and field adjustable to minimum and maximum air volumes; provides consistent airflow to the space in response to electronic thermostat signal while compensating for inlet static-pressure variations of up to 4 inches wg; includes a multipoint velocity sensor at air inlet.

N. Direct Digital Controls:

1. Terminal Unit Controller: Pressure-independent, VAV controller and integrated actuator, and electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes.

    a. Occupied and unoccupied operating mode.
    b. Remote reset of airflow or temperature set points.
    c. Adjusting and monitoring with portable terminal.
    d. Communication with temperature-control system specified in Section 230923 "Instrumentation and Control for HVAC."

2. Room Sensor: Wall mounted with temperature set-point adjustment and access for connection of portable operator terminal.
3. Temperature sensors in front-of-house spaces must be non-indicating and non-adjustable.
4. Temperature sensors in back-of-house spaces must be indicated and adjustable.

O. Control Sequence: See Section 230993.11 "Sequence of Operation for HVAC" Drawings for control sequences.

2.4 CASING LINER

A. Casing Liner, Fibrous Glass: Fibrous-glass duct liner, complying with ASTM C1071, NFPA 90A or NFPA 90B, and with NAIMA AH124.

1. Minimum Thickness: 1/2 inch.

a. Maximum Thermal Conductivity:

1) Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

2. Antimicrobial Erosion-Resistant Coating: Apply to surface of liner that will form interior surface of duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound is to be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Foil-Faced Liner: Minimum 0.001-inch reinforced, nonporous aluminum foil applied to matted insulation airstream face. Encapsulate all insulation edges with sheet metal angles and channels, or tape.
4. Solid Metal Liner: Solid galvanized sheet metal encapsulating matted insulation face from airstream.
5. Perforated Metal Liner: Perforated galvanized sheet metal encapsulating matted insulation face from airstream.
6. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C916.

a. Adhesive must have a VOC content of 80 g/L or less.
b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 SOURCE QUALITY CONTROL

A. AHRI 880 Certification: Test, rate, and label assembled air terminal units in accordance with AHRI 880.

B. AHRI 880: Test and rate assembled air terminal units in accordance with AHRI 880.

C. Water Coils: Factory pressure test to 300 psig in accordance with AHRI 410 and ASHRAE 33.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Comply with Section 230529 "Hangers and Supports for HVAC Piping and Equipment" and Section 233113 "Metal Ducts" for hangers and supports.

B. Install air terminal units according to NFPA 90A.

C. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

D. Install wall-mounted thermostats.

3.3 PIPING CONNECTIONS

A. Where installing piping adjacent to air terminal unit, allow space for service and maintenance.

B. Hot-Water Piping: Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties," and connect heating coils to supply piping with shutoff valve, strainer, control valve, and union or flange; and to return piping with balancing valve and union or flange.

3.4 DUCTWORK CONNECTIONS

A. Comply with requirements in Section 233113 "Metal Ducts" for connecting ducts to air terminal units.

B. Make connections to air terminal units with flexible connectors complying with requirements in Section 233300 "Air Duct Accessories."

3.5 ELECTRICAL CONNECTIONS

A. Install field power to each air terminal unit electrical power connection. Coordinate with air terminal unit manufacturer and installers.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

E. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conduits and Cables."

3.7 IDENTIFICATION

A. Label each air terminal unit with drawing designation, nominal airflow, maximum and minimum factory-set airflows, and coil type. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.8 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.9 ADJUSTING

A. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air terminal unit testing, adjusting, and balancing.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and inspections:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Air terminal unit will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate air terminal units.

END OF SECTION 233600

SECTION 233713.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Round ceiling diffusers.
2. Rectangular and square ceiling diffusers.
3. Linear slot diffusers.
4. Ceiling-integral continuous slot diffusers.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers.
2. Section 233713.23 "Air Registers and Grilles" for adjustable-bar register and grilles, fixed-face registers and grilles, and linear bar grilles.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples: For each exposed product and for each color and texture specified. Actual size of smallest diffuser indicated.

C. Samples for Initial Selection: For diffusers with factory-applied color finishes. Actual size of smallest diffuser indicated.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

1.5 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 ROUND CEILING DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Price Industries.
3. Titus.
4. Or approved equal.

B. Devices must be specifically designed for variable-air-volume flows.

C. Material: Steel.

D. Finish: Baked enamel, color selected by Commissioner.

E. Face Style: Plaque cone.

F. Mounting: Duct connection.

G. Pattern: Two-position horizontal.

H. Dampers: Butterfly.

I. Accessories:

1. Equalizing grid.

2. Plaster ring.
3. Safety chain.
4. Wire guard.
5. Sectorizing baffles.
6. Operating rod extension.

2.2 RECTANGULAR AND SQUARE CEILING DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Price Industries.
3. Titus.
4. Or approved equal.

B. Devices must be specifically designed for variable-air-volume flows.

C. Material: Steel.

D. Finish: Baked enamel, color selected by Commissioner.

E. Face Size: 24 by 24 inches 12 by 12 inches.

F. Face Style: Plaque.

G. Mounting: Surface.

H. Pattern: Fixed.

I. Dampers: Butterfly.

J. Accessories:

1. Equalizing grid.
2. Plaster ring.
3. Safety chain.
4. Wire guard.
5. Sectorizing baffles.
6. Operating rod extension.

2.3 LINEAR SLOT DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Price Industries.
3. Titus.
4. Or approved equal.

B. Devices must be specifically designed for variable-air-volume flows.

C. Material - Shell: Steel, noninsulated.

D. Material - Pattern Controller and Tees: Aluminum.

E. Finish - Face and Shell: Baked enamel, black.

F. Finish - Pattern Controller: Baked enamel, black.

G. Finish - Tees: Baked enamel, color selected by Commissioner.

H. Slot Width: see plans .

I. Number of Slots: see plans .

J. Length: see plans.

K. Accessories: Plaster frame.

2.4 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas where diffusers are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install diffusers level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Commissioner for a determination of final location.

C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.4 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.13

SECTION 233713.23 - AIR REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Fixed face registers and grilles.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
2. Section 233713.13 "Air Diffusers" for various types of air diffusers.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples: For each exposed product and for each color and texture specified. Smallest size register and grille indicated.

C. Samples for Initial Selection: For registers and grilles with factory-applied color finishes. Smallest size register and grille indicated.

D. Samples for Verification: For registers and grilles, in manufacturer's standard sizes to verify color selected. Smallest size register and grille indicated.

E. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

1.5 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 REGISTERS

A. Fixed Face Register :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Anemostat Products; a Mestek company.
    b. Price Industries.
    c. Titus.
    d. Or approved equal.

2. Material: Steel.
3. Finish: Baked enamel, color selected by Commissioner.
4. Face Blade Arrangement: Horizontal spaced 1/2 inch apart.
5. Face Arrangement: Perforated core.
6. Core Construction: Removable.
7. Frame: 1 inch wide.
8. Mounting: Countersunk screw.

2.2 GRILLES

A. Fixed Face Grille :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Anemostat Products; a Mestek company.
    b. Price Industries.
    c. Titus.

d. Or approved equal.

2. Material: Steel.
3. Finish: Baked enamel, color selected by Commissioner.
4. Face Blade Arrangement: Horizontal; spaced 1/2 inch apart.
5. Face Arrangement: Perforated core.
6. Core Construction: Removable.
7. Frame: 1 inch wide.
8. Mounting: Countersunk screw.

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate registers and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas where registers and grilles are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install registers and grilles level and plumb.

B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Commissioner for a determination of final location.

C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.4 ADJUSTING

A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.23

SECTION 234100 - PARTICULATE AIR FILTRATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Pleated panel filters.
2. Rigid cell box filters.
3. V-bank cell filters.
4. Front- or back-access filter frames.
5. Side-access filter housings.
6. Filter gauges.

1.3 DEFINITIONS

A. HIPS: High-impact polystyrene.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

C. Shop Drawings: For air filters. Include plans, elevations, sections, details, and attachments to other work.

1. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
2. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each filter, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Agency Qualifications: An NRTL.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in a clean, dry place.

B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.

C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.

D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.

1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remover coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.
3. Replace installed products damaged during construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. ASHRAE Compliance:

1. Comply with applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality"; Section 5 - "Systems and Equipment"; and Section 7 - "Construction and Startup."

2. Comply with ASHRAE 52.2 for MERV for methods of testing and rating air-filter units.

B. Comply with NFPA 90A and NFPA 90B.

C. Comply with UL 900.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PLEATED PANEL FILTERS

A. Description: Factory-fabricated, self-supported, extended-surface, pleated, panel-type, disposable air filters with holding frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M.
b. AAF International.
c. AirGuard; Clarcor Air Filtration Products, Inc.
d. Camfil Farr.
e. Filtration Group.
f. Flanders Corporation.
g. Koch Filter Corporation.
h. Tri-Dim Filter Corporation.
i. Or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Media: Cotton and synthetic fibers coated with nonflammable adhesive.

1. Separators must be bonded to the media to maintain pleat configuration.
2. Welded-wire grid must be on downstream side to maintain pleat.
3. Media must be bonded to frame to prevent air bypass.
4. Support members on upstream and downstream sides to maintain pleat spacing.

D. Filter-Media Frame: Galvanized steel with metal grid on outlet side and steel rod grid on inlet side, hinged, with pull and retaining handles sealed or bonded to the media.

2.3 RIGID CELL BOX FILTERS

A. Description: Factory-fabricated, adhesive-coated, disposable, packaged air filters with media perpendicular to airflow, and with holding frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AirGuard; Clarcor Air Filtration Products, Inc.
b. Air-Nu.
c. Camfil Farr.
d. Filtration Group.

e. Flanders Corporation.
f. Glasfloss Industries.
g. Koch Filter Corporation.
h. Or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Media: Fibrous material constructed so individual pleats are maintained in tapered form under rated-airflow conditions by flexible internal supports. Coat media with antimicrobial agent.

D. Filter-Media Frames: Galvanized steel.

2.4 V-BANK CELL FILTERS

A. Description: Factory-fabricated, adhesive-coated, disposable, packaged air filters with media angled to airflow, and with holding frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M.
b. AAF International.
c. AirGuard; Clarcor Air Filtration Products, Inc.
d. Camfil Farr.
e. Flanders Corporation.
f. Tri-Dim Filter Corporation.
g. Or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Media: Fibrous material constructed so individual mini-pleats are maintained in tapered form under rated-airflow conditions by flexible internal supports. Coat media with an antimicrobial agent.

D. Filter-Media Frames: HIPS.

2.5 FRONT- OR BACK-ACCESS FILTER FRAMES

A. Description: Galvanized-steel framing members with access for either upstream (front) or downstream (back) filter servicing, cut to size and prepunched for assembly into modules. Vertically support filters to prevent deflection of horizontal members without interfering with filter installation or operation.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AAF International.
b. AirGuard; Clarcor Air Filtration Products, Inc.
c. Flanders Corporation.
d. Koch Filter Corporation.
e. Or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Prefilters: Incorporate a separate track with spring clips, removable from front.

D. Sealing: Factory-installed, positive-sealing device for each row of filters, to ensure seal between gasketed filter elements and to prevent bypass of unfiltered air.

2.6 SIDE-ACCESS FILTER HOUSINGS

A. Description: Factory-assembled, side-service housings, constructed of galvanized steel, with flanges to connect to duct or casing system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AAF International.
b. AirGuard; Clarcor Air Filtration Products, Inc.
c. Camfil Farr.
d. Flanders Corporation.
e. Koch Filter Corporation.
f. Or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Prefilters: Integral tracks to accommodate 2-inch- thick, disposable or washable filters.

D. Access Doors: Hinged, with continuous gaskets on perimeter and positive-locking devices, and arranged so filter cartridges can be loaded from either access door.

E. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames and to prevent bypass of unfiltered air.

2.7 FILTER GAUGES

A. Diaphragm-type gauge with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AirGuard; Clarcor Air Filtration Products, Inc.
b. Ashcroft
c. Dwyer Instruments, Inc.
d. Or approved equal.

B. Source Limitations: Obtain from single source from single manufacturer.

1. Diameter: 4-1/2 inches.
2. Scale Range for Filter Media Having a Recommended Final Resistance of 1.0- to 2.0-Inch wg or Less: 0- to 2.0-inch wg.

C. Manometer-Type Filter Gauge: Molded plastic, with epoxy-coated aluminum scale and logarithmic-curve tube gage with integral leveling gage, graduated to read from 0- to 3.0-inch wg, and accurate within 3 percent of the full-scale range.

D. Accessories: Static-pressure tips, tubing, gauge connections, and mounting bracket.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine ducts, air-handling units, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF FILTERS

A. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.

B. Install filters in position to prevent passage of unfiltered air.

C. Install filter gauge for each filter bank.

D. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing with new, clean filters.

E. Coordinate filter installations with duct and air-handling-unit installations.

3.4 INSTALLATION OF FILTER GAUGES

A. Install filter gauge for each filter bank.

B. Install filter-gauge, static-pressure tips upstream and downstream from filters. Install filter gauges on filter banks with separate static-pressure taps upstream and downstream from filters. Mount filter gauges on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gauges.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring between pressure sensors and Direct Digital Control system.

C. Connect control wiring between controlled devices.

D. Connect control wiring according to Section 260519 "Low-Voltage Electrical Power Conduits and Cables."

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

1. Test for leakage of unfiltered air while system is operating.

C. Air filter will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 CLEANING

A. After completing system installation and testing, adjusting, and balancing of air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION 234100

SECTION 235123 - GAS VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Listed double-wall vents.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for product.

B. Shop Drawings: For vents.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of hangers and seismic restraints.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in vents.

C. Certified Sizing Calculations: Manufacturer must certify venting system sizing calculations.

PART 2 - PRODUCTS

2.1 LISTED TYPE L VENTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Heat-Fab, Inc.
2. Metal-Fab, Inc.
3. Schebler Co. (The).
4. Selkirk Corporation; Selkirk Metalbestos and Air Mate.
5. Van-Packer Company, Inc.
6. Or approved equal.

B. Description: Double-wall metal vents tested according to UL 641 and rated for 570 deg F continuously or 1700 deg F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.

C. Construction: Inner shell and outer jacket separated by at least a 4-inchairspace filled with high-temperature, mineral-wool insulation.

D. Inner Shell: ASTM A 666, Type 316 stainless steel.

E. Outer Jacket: Stainless steel.

F. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.

1. Termination: Stack cap designed to exclude 90 percent of rainfall.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 APPLICATION

A. Listed Type B and BW Vents: Vents for certified gas appliances.

B. Listed Type L Vent: Vents for low-heat appliances.

C. Listed Special Gas Vent: Condensing gas appliances.

3.4 INSTALLATION OF LISTED VENTS

A. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

B. Comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.

C. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.

D. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.

E. Lap joints in direction of flow.

3.5 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.

END OF SECTION 235123

SECTION 235133 - INSULATED SECTIONAL CHIMNEYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Listed building-heating-appliance chimneys.
2. Guying and bracing materials.

B. Related Requirements:

1. Section 235123 "Gas Vents" for Type B and BW vents, Type L vents, and listed special gas vents.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for product.

B. Shop Drawings: For chimneys and stacks.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of hangers and seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in stacks.

C. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.

PART 2 - PRODUCTS

2.1 LISTED BUILDING-HEATING-APPLIANCE CHIMNEYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Heat-Fab, Inc.
2. Metal-Fab, Inc.
3. Schebler Co. (The).
4. Or approved equal.

B. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 deg F continuously or 1700 deg F for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.

C. Construction: Inner shell and outer jacket separated by at least a 4-inch annular space filled with high-temperature, ceramic-fiber insulation.

D. Inner Shell: ASTM A 666, Type 316 stainless steel.

E. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.

1. Termination: Round chimney top designed to exclude minimum 98 percent of rainfall.

2.2 GUYING AND BRACING MATERIALS

A. Cable: Four galvanized, stranded wires of the following thickness:

1. Minimum Size: 1/4 inch in diameter.
2. For ID Sizes 4 to 15 Inches: 5/16 inch.
3. For ID Sizes 18 to 24 Inches: 3/8 inch.
4. For ID Sizes 27 to 30 Inches: 7/16 inch.
5. For ID Sizes 33 to 36 Inches: 1/2 inch.

6. For ID Sizes 39 to 48 Inches: 9/16 inch.
7. For ID Sizes 51 to 60 Inches: 5/8 inch.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 APPLICATION

A. Listed Building-Heating-Appliance Chimneys: Dual-fuel boilers, oven vents, water heaters, exhaust for engines, fireplaces, and other solid-fuel-burning appliances.

3.4 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.

B. Provide temporary closures at ends of chimneys and stacks that are not completed or connected to equipment.

END OF SECTION 235133

SECTION 235216 - CONDENSING BOILERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for boilers.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 90.1.

C. Shop Drawings: For boilers, boiler trim, and accessories.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

D. Engineering Services Submittal: For each boiler.

1. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer licensed in the State of New York.

    a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
    b. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

E. Coordination Drawings: Plans and sections, drawn to scale and coordinated with each other, using input from installers of the items involved.

1.4 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

D. Product Certificates:

1. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, and document hydrostatic testing of piping external to boiler.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For boilers to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period. Where "prorated" is indicated, the boiler manufacturer will cover the indicated percentage of cost of replacement parts. With "prorated" type, covered cost decreases as age of equipment increases.

1. Warranty Period for Floor-Mounted Water-Tube Condensing Boilers:

a. Heat Exchanger and Tank: Free from defects in material and workmanship.
b. Warranty Coverage: Prorated Year 0 to 5 - 100 percent; Year 6 to 7 - 50 percent; Year 8 to 9 - 30 percent; Year 10- 10 percent years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.

C. ASHRAE/IES 90.1 Compliance: Boilers must have minimum efficiency in accordance with Table 6.8.1-6 and other requirements in Ch. 6 of ASHRAE/IES 90.1.

D. ASHRAE 90.2 Compliance: Boilers must have minimum efficiency in accordance with Ch. 6 of ASHRAE 90.2.

E. DOE Compliance: Minimum efficiency must comply with 10 CFR 431, Subpart E, Appendix N.

F. Mounting Base: For securing boiler to concrete base.

2.2 FLOOR-MOUNTED, WATER-TUBE CONDENSING BOILERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AERCO; A WATTS Brand.
2. Bosch Thermotechnology.
3. Cleaver-Brooks.
4. Embassy Industries, Inc.
5. Hydrotherm, Inc./Mestek, Inc.
6. Viessmann Manufacturing Co. (US) Inc.
7. Or approved equal.

B. Description: Factory-fabricated, -assembled, and -tested, water-tube, forced-draft, condensing boiler with heat exchanger sealed pressure tight, built on a steel base, including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls. Units are to be for water-heating service only.

C. Heat Exchanger: Stainless steel primary and secondary heat exchangers.

D. Combustion Chamber: Stainless steel, sealed.

E. Burner: Natural gas, forced draft drawing from gas-premixing valve.

F. Blower: Centrifugal fan to operate during each burner-firing sequence and to prepurge and postpurge the combustion chamber.

1. Motors: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

a. Motor Sizes: Large enough so driven load will not require motor to operate in service factor range above 1.0.

G. Gas Train: Combination gas valve with manual shutoff and pressure regulator.

H. Ignition: Direct-spark ignition or silicone carbide hot-surface ignition with 100 percent main-valve shutoff and electronic flame supervision.

I. Integral Circulator: Cast-iron body and stainless steel impeller sized for minimum flow required in heat exchanger.

J. Casing:

1. Jacket: Sheet metal, with snap-in or interlocking closures.
2. Control Compartment Enclosures: NEMA 250, Type 1A.
3. Finish: Powder-coated protective finish.
4. Insulation: Minimum 2-inch- thick, mineral-fiber insulation surrounding the heat exchanger.
5. Combustion-Air Connections: Inlet and vent duct collars.

2.3 TRIM - FOR HOT-WATER BOILERS

A. Include devices sized to comply with ASME B31.9.

B. Aquastat Controllers: Operating, firing rate, and high limit with automatic reset.

C. Safety Relief Valve: ASME rated.

D. Pressure and Temperature Gauge: Minimum 3-1/2-inch- diameter, combination water-pressure and -temperature gauge. Gauges must have operating-pressure and -temperature ranges, so normal operating range is about 50 percent of full range.

E. High and low gas-pressure switches.

F. Alarm bell with silence switch.

G. Boiler Air Vent: Automatic .

H. Drain Valve: Minimum NPS 3/4 hose-end gate valve.

I. Circulation Pump: Nonoverloading, in-line pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.

2.4 CONTROLS

A. Refer to Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control."

B. Boiler operating controls must include the following devices and features:

1. Control transformer.
2. Set-Point Adjust: All set points must be adjustable.
3. Electric, factory-fabricated and factory-installed panel to control burner-firing rate, to reset supply-water temperature inversely with outside-air temperature. At 0 deg F outside-air temperature, set supply-water temperature at 140 deg F; at 60 deg F outside-air temperature, set supply-water temperature at 90 deg F.

a. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

C. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.

1. High Cutoff: Automatic reset stops burner if operating conditions rise above maximum boiler design temperature.
2. Low-Water Cutoff Switch: Electronic probe must prevent burner operation on low water. Cutoff switch must be automatic-reset type.
3. Blocked Inlet Safety Switch: Manual-reset pressure switch factory mounted on boiler combustion-air inlet.
4. Audible Alarm: Factory mounted on control panel with silence switch; must sound alarm for above conditions.

D. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.

1. Hardwired Points:

a. Monitoring: On/off status, common trouble alarm low-water-level alarm .
b. Control: On/off operation, hot-water-supply temperature set-point adjustment .

2. A BACnet communication interface with building automation system must enable building automation system operator to remotely control and monitor the boiler from an operator workstation. All monitoring and control features, which are available at the local boiler control panel, must also be available at the remote operator workstation through the building automation system.

2.5 ELECTRICAL POWER

A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are shown on Drawings and specified in electrical Sections.

B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary must provide a single-point field power connection to boiler.

1. House in NEMA 250, Type 1 enclosure.
2. Wiring must be numbered and color coded to match wiring diagram.
3. Install factory wiring outside of an enclosure in a metal raceway.
4. Field power interface must be to fused disconnect switch .
5. Provide branch power circuit to each motor and to controls with a disconnect switch or circuit breaker.
6. Provide each motor with overcurrent protection.

2.6 CONDENSATE-NEUTRALIZATION UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Neutra-Safe Corporation.
2. SFA Saniflo USA.
3. Skidmore Pump.
4. Wessels Company.
5. Or approved equal.

B. Description: Factory-fabricated and -assembled condensate-neutralizing tank assembly of corrosion-resistant plastic material with threaded or flanged inlet and outlet pipe connections. Device functions to prevent acidic condensate from damaging grain system. It is to be piped to receive acidic condensate discharged from condensing boiler and neutralize it by chemical reaction with replaceable neutralizing agent. Neutralized condensate is then piped to suitable drain.

C. Tank features:

1. All corrosion-resistant material.
2. Suitable for use on all natural gas and propane boilers.
3. Includes initial charge of neutralizing agent.
4. Neutralizing agent to be easily replaceable when exhausted.
5. Inlet and outlet pipe connections.

D. Capsule Configuration:

1. Low-profile design for applications where boiler condensate drain is close to the floor.
2. Easily removed and opened for neutralizing agent replacement.
3. Multiple units may be used for larger capacity.

E. Tank Configuration:

1. Utilized where boiler is elevated or where tank is installed in a pit with tank top flush with floor.
2. Top easily removed for neutralizing agent replacement.
3. Internal baffles to channel flow for complete neutralization.
4. Integral bypass to prevent condensate backflow into appliance.
5. Multiple units may be used for larger capacity.

2.7 SOURCE QUALITY CONTROL

A. UL Compliance, Gas-Fired: Test gas-fired boilers for compliance with UL 2764. Boilers must be listed and labeled by a testing agency acceptable to 2014 NYC Building Codes.

B. Performance Testing: Test and label boilers for efficiency to comply with AHRI 1500.

C. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.

D. Test and inspect factory-assembled boilers, before shipping, in accordance with 2017 ASME Boiler and Pressure Vessel Code. Factory test boilers for safety and functionality; fill boiler with water, and fire throughout firing range, to prove operation of all safety components.

E. Allow Commissioner access to source quality-control testing of boilers. Notify Commissioner 14 days in advance of testing.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting performance of the Work.

1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 BOILER INSTALLATION

A. Equipment Mounting:

1. Install floor-mounted boilers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

B. Install gas-fired boilers according to NFPA 54.

C. Assemble and install boiler trim.

D. Install electrical devices furnished with boiler but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

3.4 PIPING CONNECTIONS

A. Comply with requirements for hydronic piping specified in Section 232113 "Hydronic Piping."

B. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service. Flexible connectors and their installation are specified in Section 232116 "Hydronic Piping Specialties."

C. Drawings indicate general arrangement of piping, fittings, and specialties.

D. When installing piping adjacent to boiler, allow space for service and maintenance of condensing boilers. Arrange piping for easy removal of condensing boilers.

E. Install condensate drain piping to condensate-neutralization unit and from neutralization unit to nearest floor drain. Piping must be at least full size of connection. Install piping with a minimum of 2 percent downward slope in direction of flow.

F. Connect gas piping to boiler gas-train inlet with union. Piping must be at least full size of gas-train connection. Provide a reducer if required.

G. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve, and union or flange at each connection.

H. Install piping from safety relief valves to nearest floor drain.

3.5 DUCT CONNECTIONS

A. Boiler Venting:

1. Connect boiler vent full size to boiler connections.
2. Comply with requirements in Section 235123 "Gas Vents."
3. Comply with all boiler manufacturer's installation instructions.

3.6 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.7 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

C. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. Perform installation and startup checks in accordance with manufacturer's written instructions.
2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

    a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.
    b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Boiler will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.9 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate boilers. Video record the instruction sessions and provide electronic copy to Commissioner.

1. Instructor must be factory trained and certified.
2. Provide not less than two hours of instruction.
3. Instruct personnel in operation to obtain maximum efficiency in plant operation.
4. Provide instructional videos that are coordinated with operation and maintenance manuals.
5. Obtain Commissioner sign-off that instruction is complete.
6. Instruction must be held at Project site.

END OF SECTION 235216

SECTION 237416.13 - PACKAGED, LARGE-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes packaged, large-capacity, rooftop air conditioning units (RTUs) with the following components:

1. Casings.
2. Fans, drives, and motors.
3. Rotary heat exchanger.
4. Coils.
5. Refrigerant circuit components.
6. Air filtration.
7. Gas furnaces.
8. Dampers.
9. Electrical power connections.
10. Controls.
11. Roof curbs.
12. Accessories.

1.3 DEFINITIONS

A. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, large-capacity, rooftop air-conditioning units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each RTU.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

2. Include rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.
3. Include unit dimensions and weight.
4. Include cabinet material, metal thickness, finishes, insulation, and accessories.
5. Fans:

    a. Include certified fan-performance curves with system operating conditions indicated.
    b. Include certified fan-sound power ratings.
    c. Include fan construction and accessories.
    d. Include motor ratings, electrical characteristics, and motor accessories.

6. Include certified coil-performance ratings with system operating conditions indicated.
7. Include filters with performance characteristics.
8. Include gas furnaces with performance characteristics.
9. Include factory selection calculations for each antimicrobial ultraviolet lamp installation.
10. Include dampers, including housings, linkages, and operators.

B. Sustainable Design Submittals:

1. Product Data: For air filtration performance.
2. Product Data: For energy performance.

C. Shop Drawings: For each packaged, large-capacity, rooftop air-conditioning units.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

D. Coordination Drawings: Floor plans and other details, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

E. Engineering Services Submittal: For RTU supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York, who is responsible for their preparation.

1. Include design calculations for selecting vibration isolators and for designing vibration isolation bases.
2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
3. Wind- Restraint Details: Detail fabrication and attachment of wind and seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.6 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's warranty.

B. Product Certificates: Submit certification that specified equipment will withstand wind forces identified in "Performance Requirements" Article and in Section 230548.13 "Vibration Controls for HVAC."

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of wind force and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Source quality-control reports.

D. System startup reports.

E. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 SPECIAL WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of outdoor, semi-custom, air-handling unit that fail in materials or workmanship within specified warranty period.

1. Warranty Period: five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of RTUs and components.

C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE 15 Compliance: For refrigeration system safety.

E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. UL Compliance: Comply with UL 1995.

G. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design mounting and restraints for RTUs, including comprehensive engineering analysis.

1. Design RTU supports to comply with wind performance requirements.

H. Wind-Restraint Performance:

1. Basic Wind Speed: 108mph .
2. Building Classification Category: II.
3. Minimum 10 lb/sq. ft. multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AAON.
2. Carrier Corporation; a unit of United Technologies Corp.
3. Daikin Applied.
4. Trane.
5. YORK; a Johnson Controls company.
6. Or approved equal.

2.3 UNIT CASINGS

A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

B. Double-Wall Construction:

1. Outside Casing Wall: Galvanized steel, minimum 18 gauge thick with corrosion-resistant coating, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.
2. Inside Casing Wall: G90-coated galvanized steel, 0.034 inch thick, perforated 40 percent free area.
3. Floor Plate: G90 galvanized steel, treadplate, minimum 18 gauge thick.
4. Casing Insulation:

a. Materials: Injected polyurethane foam insulation.
b. Casing Panel R-Value: Minimum 10.
c. Insulation Thickness: 2 inches.

d. Thermal Break: Provide continuity of insulation with no through-casing metal in casing walls, floors, or roof of unit.

C. Airstream Surfaces: Surfaces in contact with airstream must comply with requirements in ASHRAE 62.1.

D. Static-Pressure Classifications:

1. For Unit Sections Upstream of Fans: Minus 3-inch wg.
2. For Unit Sections Downstream and Including Fans: 3-inch wg.

E. Panels and Doors:

1. Panels:

a. Fabrication: Formed and reinforced with same materials and insulation thickness as casing.
b. Fasteners: Two or more camlock type for panel lift-out operation. Arrangement must allow panels to be opened against air-pressure differential.
c. Gasket: Neoprene, applied around entire perimeters of panel frames.
d. Size: Large enough to allow inspection and maintenance of air-handling unit's internal components. Dimensions to be at least 24 inches wide by full height of unit casing up to a maximum height of 72 inches.

2. Access Doors:

a. Hinges: A minimum of two ball-bearing hinges or stainless steel piano hinge and two wedge-lever-type latches, operable from inside and outside. Arrange doors to be opened against air-pressure differential.
b. Gasket: Neoprene, applied around entire perimeters of panel frames.
c. Size: Large enough to allow inspection and maintenance of air-handling unit's internal components. Dimensions to be at least 24 inches wide by full height of unit casing up to a maximum height of 72 inches.

3. Locations and Applications:

a. Fan Section: Doors and inspection and access panels.
b. Access Section: Doors.
c. Coil Section: Inspection and access panels.
d. Damper Section: Doors.
e. Filter Section: Doors large enough to allow periodic removal and installation of filters.
f. Mixing Section: Doors.

4. Service Light: 100-W vaporproof fixture with switched junction box located outside adjacent to door.

a. Locations: Each section accessed with door.

F. Condensate Drain Pans:

1. Location: Each type of cooling coil.

2. Construction:

   a. Single-wall, stainless steel sheet.

3. Drain Connection:

   a. Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
   b. Minimum Connection Size: NPS 1.

4. Slope: Minimum 0.125-in./ft. slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and from humidifiers and to direct water toward drain connection.
5. Length: Extend drain pan downstream from leaving face for distance to comply with ASHRAE 62.1.
6. Width: Entire width of water producing device.
7. Depth: A minimum of 2 inches deep.
8. Pan-Top Surface Coating for Galvanized-Steel Drain Pans: Asphaltic waterproofing compound.
9. Units with stacked coils must have an intermediate drain pan to collect condensate from top coil.

2.4 FANS, DRIVES, AND MOTORS

A. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.

B. Supply-Air Fans: Centrifugal, rated according to AMCA 210; galvanized or painted steel; mounted on solid-steel shaft.

1. Shafts: With field-adjustable alignment.

   a. Turned, ground, and polished hot-rolled steel with keyway.

2. Shaft Bearings:

   a. Heavy-duty, self-aligning, pillow-block type with an L- rated life of minimum 100,000 hours according to ABMA 9.

3. Housings: Formed- and reinforced-steel panels to form curved scroll housings with shaped cutoff and spun-metal inlet bell.

   a. Bracing: Steel angle or channel supports for mounting and supporting fan scroll, wheel, motor, and accessories.

4. Centrifugal Fan Wheels: Inlet flange, backplate, and mustow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; steel or aluminum hub swaged to backplate and fastened to shaft with setscrews.
5. Mounting: For internal vibration isolation. Factory-mount fans with manufacturer's standard vibration isolation mounting devices having a minimum static deflection of 1 inch.
6. Shaft Lubrication Lines: Extended to a location outside the casing.

7. Flexible Connector: Factory fabricated with a fabric strip minimum 3-1/2 inches wide, attached to two strips of minimum 2-3/4-inch- wide by 0.028-inch- thick, galvanized-steel sheet.

    a. Flexible Connector Fabric: Glass fabric, double coated with neoprene. Fabrics, coatings, and adhesives must comply with UL 181, Class 1.

C. Drives, Belt: Factory-mounted, V-belt drive, with adjustable alignment and belt tensioning, and with 1.5 service factor based on fan motor.

1. Pulleys: Cast iron or cast steel with split, tapered bushing, dynamically balanced at the factory.
2. Belts: Oil resistant, non-sparking and nonstatic; in matched sets for multiple-belt drives.
3. Belt Guards: Comply with requirements specified by OSHA and fabricate according to SMACNA's "HVAC Duct Construction Standards"; 0.146-inch- thick, 3/4-inch diamond-mesh wire screen, welded to steel angle frame; prime coated.

D. Condenser-Coil Fan: Variable-speed propeller, mounted on shaft of permanently lubricated ECM motors.

E. Relief-Air Fan: Backward inclined, shaft mounted on permanently lubricated motor.

F. Motors:

1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
3. Enclosure Type: Totally enclosed, fan cooled.
4. Motor Pulleys: Adjustable pitch for use with 5 -hp motors and smaller; fixed pitch for use with motors larger than 5 hp. Select pulley size so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.

2.5 ROTARY HEAT EXCHANGERS

A. Casing:

1. Galvanized steel, stainless steel, or aluminum with manufacturer's standard factory finish.
2. Integral purge section limiting carryover of exhaust air to between 0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg differential pressure.
3. Casing seals on periphery of rotor, on duct divider, and on purge section.
4. Support vertical rotors on grease-lubricated ball bearings with extended grease fittings. Mount horizontal rotors on tapered roller bearing.

B. Rotor - Aluminum, Metallic, or Polymer: Aluminum, metallic, or polymer segmented wheel, strengthened with radial spokes impregnated with nonmigrating, water-selective, 3-angstrom molecular-sieve desiccant coating.

C. Drive: Fractional horsepower motor and gear reducer, with speed changed by variable-frequency controller. Permanently lubricated wheel bearings with an L-10 400,000 hours.

D. Controls:

1. Starting relay, factory mounted and wired, and manual motor starter for field wiring.
2. Variable-frequency controller, factory mounted and wired, with exhaust- and outdoor-air sensors, automatic changeover thermostat and set-point adjuster, to vary rotor speed and maintain exhaust temperature above freezing and air differential temperature above set point. Provide maximum rotor speed when exhaust-air temperature is less than outdoor-air temperature.
3. Control energy recovery to permit air economizer operation.

    a. Bypass dampers to assist energy recovery control.

4. Pilot-Light Indicator: Display rotor rotation and speed.
5. Speed Settings: Adjustable settings for maximum and minimum rotor speed limits.
6. Integral purge section limiting carryover of exhaust air to between 0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg differential pressure.

2.6 COILS

A. General Requirements for Coils:

1. Comply with AHRI 410.
2. Fabricate coils section to allow removal and replacement of coil for maintenance and to allow in-place access for service and maintenance of coil(s).
3. Coils must not act as structural component of unit.

B. Supply-Air Refrigerant Coil:

1. Tubes: Copper.
2. Fins:

    a. Material: Aluminum.
    b. Fin Spacing: Maximum 12 fins per inch.

3. Fin and Tube Joints: Mechanical bond.
4. Headers: Seamless-copper headers with brazed connections.
5. Frames: Galvanized steel.
6. Coatings: None.
7. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.

    a. Working Pressure: Minimum 300 psig.

C. Hot-Gas Reheat Refrigerant Coil:

1. Tubes: Copper.
2. Fins:

    a. Material: Aluminum.
    b. Fin Spacing: Maximum 12 fins per inch.

3. Fin and Tube Joints: Mechanical bond.
4. Headers: Seamless-copper headers with brazed connections.
5. Frames: Galvanized steel.
6. Coatings: None.
7. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.

    a. Working Pressure: Minimum 300 psig.

8. Suction-discharge bypass valve.

2.7 REFRIGERANT CIRCUIT COMPONENTS

A. Number of Refrigerant Circuits: Two.

B. Compressor: Hermetic, variable speed scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.

C. Refrigeration Specialties:

1. Refrigerant: R-410A.
2. Expansion valve with replaceable thermostatic element.
3. Refrigerant filter/dryer.
4. Manual-reset high-pressure safety switch.
5. Automatic-reset low-pressure safety switch.
6. Minimum off-time relay.
7. Automatic-reset compressor motor thermal overload.
8. Brass service valves installed in compressor suction and liquid lines.
9. Low-ambient kit high-pressure sensor.
10. Hot-gas reheat solenoid valve modulating with a replaceable magnetic coil.
11. Hot-gas bypass solenoid valve with a replaceable magnetic coil.
12. Four-way reversing valve with a replaceable magnetic coil, thermostatic expansion valves with bypass check valves, and a suction line accumulator.

2.8 AIR FILTRATION

A. Particulate air filtration is specified in Section 234100 "Particulate Air Filtration."

B. Adhesive, Sustainability Projects: As recommended by air-filter manufacturer and with a VOC content of 80 g/L or less.

2.9 GAS FURNACES

A. Description: Factory assembled, piped, and wired; complying with ANSI Z21.47/CSA 2.3 and NFPA 54.

B. CSA Approval: Designed and certified by and bearing label of CSA.

C. Burners: Stainless steel.

1. Rated Minimum Turndown Ratio: 30 to 1.
2. Fuel: Natural gas.
3. Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.
4. Gas Control Valve: Modulating.
5. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

D. Heat-Exchanger and Drain Pan: Stainless steel.

E. Venting, Gravity: Gravity vented with vertical extension.

F. Venting, Power: Power vented, with integral, motorized centrifugal fan interlocked with gas valve with vertical extension.

G. Safety Controls:

1. Gas Manifold: Safety switches and controls complying with ANSI standards and FM Global.

2.10 DAMPERS

A. Dampers: Comply with requirements in Section 230923.12 "Control Dampers."

B. Barometric relief dampers.

C. Damper Operators: Comply with requirements in Section 230923.12 "Control Dampers."

2.11 ELECTRICAL POWER CONNECTIONS

A. RTU must have a single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.12 CONTROLS

A. Basic Unit Controls:

1. Control-voltage transformer.
2. Unit-Mounted Annunciator Panel for Each Unit:

a. Lights to indicate power on, cooling, heating, fan running, filter dirty, and unit alarm or failure.
b. Direct Digital Control controller or programmable timer and interface with HVAC instrumentation and control system.
c. Digital display of outdoor-air temperature, supply-air temperature, return-air temperature, economizer damper position, indoor-air quality, and control parameters.

B. Direct Digital Control Controller:

1. Controller must have volatile-memory backup.

2. Safety Control Operation:

    a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
    b. Firestats: Stop fan and close outdoor-air damper if air greater than 130 deg F enters unit. Provide additional contacts for alarm interface to fire alarm control panel.
    c. Fire Alarm Control Panel Interface: Provide control interface to coordinate with operating sequence described in Section 284621.11 "Addressable Fire-Alarm Systems."
    d. Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than 40 deg F.
    e. Defrost Control for Condenser Coil: Pressure differential switch to initiate defrost sequence.

3. Scheduled Operation: Occupied and unoccupied periods on 365-day clock with a minimum of four programmable periods per day.
4. Unoccupied Period:

    a. Heating Setback: Plus 10 deg F.
    b. Cooling Setback: System off.
    c. Override Operation: Two hours.

5. Supply Fan Operation:

    a. Occupied Periods: Run fan continuously.
    b. Unoccupied Periods: Cycle fan to maintain setback temperature.

6. Refrigerant Circuit Operation:

    a. Occupied Periods: Cycle or stage compressors, and operate hot-gas bypass to match compressor output to cooling load to maintain discharge temperature and humidity. Cycle condenser fans to maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.
    b. Unoccupied Periods: Cycle compressors and condenser fans for heating to maintain setback temperature.
    c. Switch reversing valve for heating or cooling mode on air-to-air heat pump.

7. Hot-Gas Reheat-Coil Operation:

    a. Occupied Periods: Humidistat opens hot-gas valve to provide hot-gas reheat, and cycles compressor.
    b. Unoccupied Periods: Reheat not required.

8. Gas Furnace Operation:

    a. Occupied Periods: Modulate burner to maintain discharge temperature.
    b. Unoccupied Periods: Cycle burner to maintain setback temperature.

9. Fixed Minimum Outdoor-Air Damper Operation:

    a. Occupied Periods: Open to 25 percent.

b. Unoccupied Periods: Close the outdoor-air damper.

10. Economizer Outdoor-Air Damper Operation:

    a. Morning warm up cycles.
    b. Occupied Periods: Open to 10 percent fixed minimum intake, and maximum 100 percent of the fan capacity. Controller must permit air-side economizer operation when outdoor air is less than 60 deg F. Use outdoor-air enthalpy to adjust mixing dampers. Start relief-air fan with end switch on outdoor-air damper. During economizer cycle operation, lock out cooling.
    c. Unoccupied Periods: Close outdoor-air damper and open return-air damper.
    d. Outdoor-Airflow Monitor: Accuracy maximum plus or minus 5 percent within 15 and 100 percent of total outdoor air. Monitor microprocessor must adjust for temperature, and output must range from 2- to 10-V dc.

11. Carbon Dioxide Sensor Operation:

    a. Occupied Periods: Reset minimum outdoor-air ratio down to minimum 10 percent to maintain maximum 1000-ppm concentration.
    b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.

12. Terminal-Unit Relays:

    a. Provide heating- and cooling-mode changeover relays compatible with terminal control system required in Section 233600 "Air Terminal Units" and Section 230923 "Direct Digital Control (DDC) System for HVAC."

C. Interface Requirements for HVAC Instrumentation and Control System:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
3. Provide BACnet compatible interface for central HVAC control workstation for the following:

    a. Adjusting set points.
    b. Monitoring supply fan start, stop, and operation.
    c. Inquiring data to include outdoor-air damper position, supply- and room-air temperature and humidity.
    d. Monitoring occupied and unoccupied operations.
    e. Monitoring constant and variable motor loads.
    f. Monitoring variable-frequency drive operation.
    g. Monitoring cooling load.
    h. Monitoring economizer cycles.
    i. Monitoring air-distribution static pressure and ventilation air volume.

2.13 ROOF CURBS

A. Roof curbs with vibration isolators and wind or seismic restraints are specified in Section 230548.13 "Vibration Controls for HVAC."

B. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.

1. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.

a. Materials: ASTM C 1071, Type I or II.
b. Thickness: 2 inches.

2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.

a. Liner Adhesive: Comply with ASTM C 916, Type I.
b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
c. Liner materials applied in this location must have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.

C. Curb Dimensions: Height of 24 inches. Adaptable horizontal dimensions as required for existing roof openings.

2.14 ACCESSORIES

A. Electric heater with integral thermostat maintains minimum 50 deg F temperature in gas burner compartment.

B. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required. Outlet must be energized even if the unit main disconnect is open.

C. Low-ambient kit using variable-speed condenser fans for operation down to 35 deg F.

D. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.

E. Remote potentiometer to adjust minimum economizer damper position.

F. Return-air bypass damper.

G. Factory- or field-installed demand-controlled ventilation.

H. Safeties:

1. Smoke detector.
2. Condensate overflow switch.
3. Phase-loss reversal protection.
4. High and low pressure control.
5. Gas furnace airflow-proving switch.

I. Coil guards of painted, galvanized-steel wire.

J. Hail guards of galvanized steel, painted to match casing.

K. Concentric diffuser with white louvers and polished aluminum return grilles, insulated diffuser box with mounting flanges, and interior transition.

L. Vertical vent extensions to increase the separation between the outdoor-air intake and the flue-gas outlet.

M. Door switches to disable heating or reset set point when open.

N. Outdoor air intake weather hood with moisture eliminator.

O. Service Lights and Switch: Factory installed in each accessible section with weatherproof cover. Factory wire lights to a single-point field connection.

2.15 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

E. Comply with Section 230546 "Coatings for HVAC" for corrosion-resistant coating.

F. Corrosion-Resistant Coating: Coat with a corrosion-resistant coating capable of withstanding a 3000 -hour salt-spray test according to ASTM B117.

1. Standards:

a. ASTM B117 for salt spray.
b. ASTM D2794 for minimum impact resistance of 100 in-lb.
c. ASTM B3359 for cross-hatch adhesion of 5B.

2. Application: Immersion.
3. Thickness: 1 mil.
4. Gloss: Minimum gloss of 60 on a 60-degree meter.

2.16 SOURCE QUALITY CONTROL

A. AHRI Compliance:

1. Comply with AHRI 340/360 for testing and rating energy efficiencies for RTUs.
2. Comply with AHRI 210/240 for testing and rating energy efficiencies for RTUs
3. Comply with AHRI 270 for testing and rating sound performance for RTUs.
4. Comply with AHRI 1060 for testing and rating performance for air-to-air exchanger.

B. AMCA Compliance:

1. Comply with AMCA 11 and bear the AMCA-Certified Ratings Seal for air and sound performance according to AMCA 211 and AMCA 311.
2. Damper leakage tested in accordance with AMCA 500-D.
3. Operating Limits: Classify according to AMCA 99.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Roof Curb: Install on roof structure or concrete base, level and secure, according to NRCA's "NRCA Roofing Manual: Membrane Roof Systems." Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Section 077200 "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts. Coordinate sizes and locations of roof curbs with actual equipment provided.

1. Install normal-weight, 3000-psi, compressive strength (28-day) concrete mix inside roof curb, 4 inches thick. Concrete, formwork, and reinforcement are specified with concrete.

B. Unit Support: Install unit level on structural steel supports. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.

C. Equipment Mounting:

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

3.4 DUCT CONNECTIONS

A. Comply with duct installation requirements specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.5 ELECTRICAL CONNECTIONS

A. Connect electrical wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs as layers of black with engraved white letters at least 1/2 inch high.
3. Locate nameplate where easily visible.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring according to Section 260519 "Low-Voltage Electrical Power Conduits and Cables."

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions.

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to furnace combustion chamber.
3. Inspect for visible damage to compressor, coils, and fans.
4. Inspect internal insulation.
5. Verify that labels are clearly visible.
6. Verify that clearances have been provided for servicing.
7. Verify that controls are connected and operable.
8. Verify that filters are installed.
9. Clean condenser coil and inspect for construction debris.
10. Clean furnace flue and inspect for construction debris.
11. Connect and purge gas line.
12. Remove packing from vibration isolators.
13. Inspect operation of barometric relief dampers.
14. Verify lubrication on fan and motor bearings.
15. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
16. Adjust fan belts to proper alignment and tension.
17. Start unit according to manufacturer's written instructions.

    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.

18. Inspect and record performance of interlocks and protective devices; verify sequences.
19. Operate unit for an initial period as recommended or required by manufacturer.
20. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency.

    a. Measure gas pressure on manifold.
    b. Inspect operation of power vents.
    c. Measure combustion-air temperature at inlet to combustion chamber.
    d. Measure flue-gas temperature at furnace discharge.
    e. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
    f. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.

21. Calibrate thermostats.
22. Adjust and inspect high-temperature limits.
23. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
24. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:

a. Coil leaving-air, dry- and wet-bulb temperatures.
b. Coil entering-air, dry- and wet-bulb temperatures.
c. Outdoor-air, dry-bulb temperature.
d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

25. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
26. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

a. Supply-air volume.
b. Return-air volume.
c. Relief-air volume.
d. Outdoor-air intake volume.

27. Simulate maximum cooling demand and inspect the following:

a. Compressor refrigerant suction and hot-gas pressures.
b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

28. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:

a. High-temperature limit on gas-fired heat exchanger.
b. Low-temperature safety operation.
c. Filter high-pressure differential alarm.
d. Economizer to minimum outdoor-air changeover.
e. Relief-air fan operation.
f. Smoke and firestat alarms.

29. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.8 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.9 CLEANING

A. After completing system installation and testing, adjusting, and balancing RTUs and air-distribution systems and after completing startup service, clean RTUs internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

3.10 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. RTU will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate RTUs.

END OF SECTION 237416.13

SECTION 238129 - VARIABLE-REFRIGERANT-FLOW HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes complete VRF HVAC system(s) including, but not limited to, engineering services and the following components to make a complete operating system(s) according to requirements indicated:

1. Indoor, exposed, wall-mounted units.
2. Outdoor, air-source, heat-pump units.
3. System controls.
4. System refrigerant and oil.
5. System condensate drain piping.
6. System refrigerant piping.
7. Metal hangers and supports.
8. Metal framing systems.
9. Fastener systems.
10. Pipe stands.
11. Equipment stands.
12. Miscellaneous support materials.
13. Piping and tubing insulation.
14. System control cable and raceways.

1.3 DEFINITIONS

A. Air-Conditioning System Operation: System capable of operation with all zones in cooling only.

B. Heat-Pump System Operation: System capable of operation with all zones in either heating or cooling, but not with simultaneous heating and cooling zones that transfer heat between zones.

C. Heat Recovery System Operation: System capable of operation with simultaneous heating and cooling zones that transfer heat between zones.

D. HRCU: Heat Recovery Control Unit. HRCUs are used in heat recovery VRF HVAC systems to manage and control refrigerant between indoor units to provide simultaneous heating and cooling zones. "Heat Recovery Control Unit" is the term used by ASHRAE for what different manufacturers term as branch circuit controller, branch selector box, changeover box, flow selector unit, mode change unit, and other such terms.

E. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

F. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

G. Three-Pipe System Design: One high pressure refrigerant vapor line, one low pressure refrigerant vapor line, and one refrigerant liquid line connect a single outdoor unit or multiple manifold outdoor units in a single system to associated system HRCUs. One liquid line and refrigerant vapor line connect HRCUs to associated indoor units.

H. Two-Pipe System Design: One refrigerant vapor line and one refrigerant liquid line connect a single outdoor unit or multiple manifold outdoor units in a single system to associated system HRCUs. One refrigerant liquid line and refrigerant vapor line connect HRCUs to associated indoor units. HRCUs used in two pipe systems act as an intermediate heat exchanger and include diverting valves and gas/liquid separators to move high and low pressure refrigerant between indoor units.

I. VRF: Variable refrigerant flow.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for indoor and outdoor units.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Include operating performance at design conditions and at extreme maximum and minimum outdoor ambient conditions.
4. Include description of system controllers, dimensions, features, control interfaces and connections, power requirements, and connections.
5. Include system operating sequence of operation in narrative form for each unique indoor- and outdoor-unit control.
6. Include description of control software features.
7. Include total refrigerant required and a comprehensive breakdown of refrigerant required by each system installed.
8. Include refrigerant type and data sheets showing compliance with requirements indicated.
9. For system design software.

10. Indicate location and type of service access.

B. Sustainable Design Submittals:

1. Product Data: Indicating compliance with minimum energy performance requirements.
2. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
3. ASHRAE/IES 90.1 compliance.
4. Air-Balance Report: Documentation indicating that Work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
5. Refrigerant: Product Data for refrigerants, indicating compliance with refrigerant management practices.
6. Product Data for EA Credit "Optimize Energy Performance": Indicating that system meets efficiency requirements.
7. Product Data for EA Credit "Enhanced Refrigerant Management": Indicating that products meet requirements for refrigerant management.
8. Product Data for EA Credit "Advanced Energy Metering": For continuous metering equipment.
9. Product Data for EQ Credit "Acoustic Performance": Documentation indicating that systems and equipment comply.
10. Thermal Comfort: Product Data indicating that systems, equipment, and controls comply.

C. Shop Drawings: For VRF HVAC systems.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
4. Include diagrams and details of refrigerant piping and tubing showing installation requirements for manufacturer-furnished divided flow fittings.
5. Include diagrams for power, signal, and control wiring.

D. Samples for Initial Selection: For fully and partially exposed indoor units with factory finishes viewable by occupants.

1. Include a Sample for each unique finish with unit identification, detailed description of application, and cross-referenced floor plans showing locations.

E. Engineering Services Submittals:

1. Include calculations for selecting vibration isolators and for designing vibration isolation bases.
2. Include calculations with corresponding diagram of refrigerant piping and tubing sizing for each system installed.
3. Include calculations with corresponding floor plans indicating that refrigerant concentration limits are within allowable limits of ASHRAE 15 and CHapter 11 of the 2014 NYC Mechanical Code.
4. Include calculations showing that system travel distance for refrigerant piping and controls cabling are within horizontal and vertical travel distances set by manufacturer. Provide a comparison table for each system installed.

F. Coordination Drawings: Plans, elevations, sections, and details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural floors, roofs and associated members to which equipment, piping, ductwork, cables, and conduit will be attached.
3. Size and location of initial access modules for acoustical tile.
4. Wall-mounted controllers located in finished space showing relationship to light switches, fire-alarm devices, and other installed devices.
5. Size and location of access doors and panels installed behind walls and inaccessible ceilings for products installed behind walls and requiring access.
6. Items penetrating finished ceiling including the following:

    a. Luminaires.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Service access panels.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. For Installer: Certificate from VRF HVAC system manufacturer certifying that Installer has successfully completed prerequisite instruction administered by manufacturer for proper installation of systems, including but not limited to, equipment, piping, controls, and accessories indicated and furnished for installation.

    a. Retain copies of Installer certificates on-site and make available on request.

2. For VRF HVAC system manufacturer.
3. For VRF HVAC system provider.

B. Product Certificates: For each type of product.

C. Product Test Reports: Where tests are required, for each product, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Source quality-control reports.

E. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For VRF HVAC systems to include in emergency, operation, and maintenance manuals.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On CD or DVD, USB media, or approved cloud storage platform, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer's Qualifications:

1. Nationally recognized manufacturer of VRF HVAC systems and products.
2. Shipped VRF HVAC systems with similar requirements to those indicated in this section.
3. VRF HVAC systems and products that have been successfully tested and in use on projects of similar size and scope as this project.
4. Having complete published catalog literature, installation, and operation and maintenance manuals for all products intended for use.
5. Having full-time in-house employees for the following:

    a. Product research and development.
    b. Product and application engineering.
    c. Product manufacturing, testing, and quality control.
    d. Technical support for system installation instruction, startup, commissioning, and troubleshooting of installations.
    e. User Instruction.

C. Factory-Authorized Service Representative Qualifications:

1. Authorized representative of, and trained by, VRF HVAC system manufacturer.
2. In-place facility located within proximity of Project.
3. Demonstrated past experience with products being installed for period within three consecutive years before time of bid.
4. Demonstrated past experience on projects of similar complexity, scope, and value.
5. Staffing resources of competent and experienced full-time employees that are assigned to execute work according to schedule.
6. Service and maintenance staff assigned to support Project during warranty period.
7. Product parts inventory to support ongoing system operation for a period of not less than seven years after Substantial Completion.
8. VRF HVAC system manufacturer's backing to take over execution of Work if necessary to comply with requirements indicated. Include Project-specific written letter, signed by manufacturer's corporate officer, if requested.

D. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by VRF HVAC system manufacturer.

1. Each employee must be certified by manufacturer for proper installation of systems, including, but not limited to, equipment, piping, controls, and accessories indicated and furnished for installation.

2. Installer certification must be valid and current for duration of Project.
3. Retain copies of Installer certificates on-site and make available on request.
4. Installers must have staffing resources of competent, trained, and experienced full-time employees that are assigned to execute work according to schedule.

E. ISO Compliance: System equipment and components furnished by VRF HVAC system manufacturer must be manufactured in an ISO 9001 and ISO 14001 facility.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in a clean and dry place.

B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.

C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.

D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.

1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remover coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.

E. Replace installed products damaged during construction.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace equipment and components that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Seven years for all parts and labor.

a. For Compressor: Seven year(s) from date of Substantial Completion.
b. For Parts, Including Controls: Seven year(s) from date of Substantial Completion.
c. For Labor: Seven year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Daikin AC (Americas), Inc.
2. LG Electronics.
3. Mitsubishi Electric & Electronics USA, Inc.
4. Samsung HVAC.
5. Or approved equal.

B. Source Limitations: Obtain products from single source from single manufacturer including, but not limited to, the following:

1. Indoor and outdoor units, including accessories.
2. Controls and software.
3. HRCUs.
4. Refrigerant isolation valves.
5. Specialty refrigerant pipe fittings.

2.2 SYSTEM DESCRIPTION

A. Direct-expansion (DX) VRF HVAC system(s) with variable capacity in response to varying cooling and heating loads. System must consist of multiple indoor units, outdoor unit(s), piping, controls, and electrical power to make complete operating system(s) complying with requirements indicated.

1. Two-pipe system design.
2. System(s) operation, air-conditioning as indicated on Drawings.
3. Each system with one refrigerant circuit shared by all indoor units connected to system.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. AHRI Compliance: System and equipment performance certified according to AHRI 1230 and products listed in AHRI directory.

D. ASHRAE Compliance:

1. ASHRAE 15: For safety code for mechanical refrigeration.
2. ASHRAE 62.1: For indoor air quality.
3. ASHRAE 135: For control network protocol with remote communication.
4. ASHRAE/IES 90.1 Compliance: For system and component energy efficiency.

E. UL Compliance: Comply with UL 1995.

2.3 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design complete and operational VRF HVAC system(s) complying with requirements indicated.

1. Provide system refrigerant calculations.

    a. Refrigerant concentration limits must be within allowable limits of ASHRAE 15 and Chapter 11 of the 2014 NYC Mechanical Code.
    b. Indicate compliance with manufacturer's maximum vertical and horizontal travel distances. Prepare a comparison table for each system showing calculated distances compared to manufacturer's maximum allowed distances.

2. Include a mechanical ventilation system and gas detection system as required to comply with ASHRAE 15 and Chapter 11 of the 2014 NYC Mechanical Code.
3. System Refrigerant Piping and Tubing:

    a. Arrangement: Arrange piping to interconnect indoor units and outdoor unit(s) in compliance with manufacturer requirements and requirements indicated.
    b. Routing: Conceal piping above ceilings and behind walls to maximum extent possible.
    c. Sizing: Size piping system, using a software program acceptable to manufacturer, to provide performance requirements indicated. Consider requirements to accommodate future change requirements.

4. System Controls:

    a. Network arrangement.
    b. Network interface with other building systems.
    c. Product selection.
    d. Sizing.

B. Service Access:

1. Provide and document service access requirements.
2. Locate equipment, system isolation valves, and other system components that require service and inspection in easily accessible locations. Avoid locations that are difficult to access if possible.
3. Where serviceable components are installed behind walls and above inaccessible ceilings, provide finished assembly with access doors or panels to gain access. Properly size the openings to allow for service, removal, and replacement.
4. If less than full and unrestricted access is provided, locate components within an 18-inch reach of the finished assembly.
5. Where ladder access is required to service elevated components, provide an installation that provides for sufficient access within ladder manufacturer's written instructions for use.
6. Comply with OSHA regulations.

C. System Design and Installation Requirements:

1. Design and install systems indicated according to manufacturer's recommendations and written instructions.
2. Where manufacturer's requirements differ from requirements indicated, contact Commissioner for direction. The most stringent requirements should apply unless otherwise directed in writing by Commissioner.

D. System Adaptability to Future Changes: Arrange and size system refrigerant piping to accommodate future changes to system without having to resize and replace existing refrigerant piping.

1. Future changes to system(s) indicated on Drawings.
2. Each branch circuit must accommodate addition of one indoor unit(s) with unit capacity equal to largest indoor unit connected to the branch circuit.
3. Each branch circuit must accommodate deletion of one indoor unit(s) with unit capacity equal to largest indoor unit connected to the branch circuit.

E. Isolation of Equipment: Provide isolation valves to isolate each indoor unit and outdoor unit for service, removal, and replacement without interrupting system operation.

F. System Capacity Ratio: The sum of connected capacity of all indoor units must be within the following range of outdoor-unit rated capacity:

1. Not less than 50 percent.
2. Not more than 130 percent.
3. Range acceptable to manufacturer.

G. System Turndown: Stable operation down to 20 percent of outdoor-unit capacity.

H. System Auto Refrigerant Charge: Each system must have an automatic refrigerant charge function to ensure the proper amount of refrigerant is installed in system.

I. Outdoor Conditions:

1. Suitable for outdoor ambient conditions encountered.

    a. Design equipment and supports to withstand wind loads of 2014 NYC Building code and ASCE/SEI 7.
    b. Design equipment and supports to withstand snow and ice loads of 2014 NYC Building code and ASCE/SEI 7.
    c. Provide corrosion-resistant coating for components and supports where located in coastal or industrial climates that are known to be harmful to materials and finishes.

2. Maximum System Operating Outdoor Temperature: See Drawings.
3. Minimum System Operating Outdoor Temperature: See Drawings.

J. Sound Performance: Sound levels generated by operating HVAC equipment must be within requirements indicated.

1. Indoor: Within design guidelines of "2015 ASHRAE HANDBOOK- HVAC Applications."
2. Outdoor: Within the limitations set by the New York City Noise Code.

K. Thermal Movements: Allow for controlled thermal movements from ambient, surface, and system temperature changes.

L. Capacities and Characteristics: As indicated on Drawings.

2.4 INDOOR, EXPOSED, WALL-MOUNTED UNITS

A. Description: Factory-assembled and -tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

B. Cabinet:

1. Material: Painted steel, or coated steel frame covered by a plastic cabinet, with an architectural acceptable finish suitable for tenant occupancy on exposed surfaces.
2. Insulation: Manufacturer's standard internal insulation, complying with ASHRAE 62.1, to provide thermal resistance and prevent condensation.
3. Mounting: Manufacturer-designed provisions for field installation.
4. Internal Access: Removable panels of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

C. DX Coil Assembly:

1. Coil Casing: Aluminum, galvanized, or stainless steel.
2. Coil Fins: Aluminum, mechanically bonded to tubes, with arrangement required by performance.
3. Coil Tubes: Copper, of diameter and thickness required by performance.
4. Expansion Valve: Electronic modulating type with linear or proportional characteristics.
5. Unit Internal Tubing: Copper tubing with brazed joints.
6. Unit Internal Tubing Insulation: Manufacturer's standard insulation, of thickness to prevent condensation.
7. Field Piping Connections: Manufacturer's standard.
8. Factory Charge: Dehydrated air or nitrogen.
9. Testing: Factory pressure tested and verified to be without leaks.

D. Drain Assembly:

1. Pan: Non-ferrous material, with bottom sloped to low point drain connection.
2. Condensate Removal: Gravity.

    a. If a floor drain is not available at unit, provide unit with field-installed condensate pump accessory.

3. Field Piping Connection: Non-ferrous material with threaded NPT.

E. Fan and Motor Assembly:

1. Fan(s):

    a. Direct-drive arrangement.

b. Single or multiple fans connected to a common motor shaft and driven by a single motor.
c. Fabricated from non-ferrous components or ferrous components with corrosion protection finish.
d. Wheels statically and dynamically balanced.

2. Motor: Brushless dc or electronically commutated with permanently lubricated bearings.
3. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
4. Speed Settings and Control: Two (low, high), three (low, medium, high), or more than three speed settings or variable speed with a speed range of least 50 percent.
5. Vibration Control: Integral isolation to dampen vibration transmission.

F. Filter Assembly:

1. Access: Front, to accommodate filter replacement without the need for tools.
2. Efficiency: MERV 8.
3. Washable Media: Manufacturer's standard filter with antimicrobial treatment.

G. Grille Assembly: Manufacturer's standard discharge grille with field-adjustable air pattern mounted in top or front face of unit cabinet.

H. Unit Accessories:

1. Remote Room Temperature Sensor Kit: Wall-mounted, hardwired room temperature sensor kit for use in rooms that do not have room temperature measurement.
2. Condensate Pump: Integral reservoir and control with electrical power connection through unit power.

I. Unit Controls:

1. Enclosure: Manufacturer's standard, and suitable for indoor locations.
2. Factory-Installed Controller: Configurable digital control.
3. Factory-Installed Sensors: Unit inlet air temperature.
4. Field-Customizable I/O Capability:

a. Analog Inputs: Four for use in customizable control strategies.
b. Digital Inputs: Four for use in customizable control strategies.
c. Digital Outputs: Four for use in customizable control strategies.

5. Features and Functions: Self-diagnostics, time delay, auto-restart , auto operation mode , filter service notification , drain assembly high water level safety shutdown and notification , run test switch.
6. Communication: Network communication with other indoor units and outdoor unit(s).
7. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
8. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.

J. Unit Electrical:

1. Enclosure: Manufacturer's standard, and suitable for indoor locations.

2. Field Connection: Single point connection to power entire unit and integral controls.
3. Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4. Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5. Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6. Raceways: Enclose line voltage wiring in metal raceways to comply with NFPA 70.

2.5 OUTDOOR, AIR-SOURCE HEAT-PUMP UNITS

A. Description: Factory-assembled and -tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

1. Specially designed for use in systems with either all heating or all cooling demands, but not for use in systems with simultaneous heating and cooling.
2. Systems must consist of one unit, or multiple unit modules that are designed by variable refrigerant system manufacturer for field interconnection to make a single refrigeration circuit that connects multiple indoor units.
3. All units installed must be from the same product development generation.

B. Cabinet:

1. Galvanized steel and coated with a corrosion-resistant finish.

    a. Coating with documented salt spray test performance of 1000 hours according ASTM B117 surface scratch test (SST) procedure.

2. Mounting: Manufacturer-designed provisions for field installation.
3. Internal Access: Removable panels or hinged doors of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

C. Compressor and Motor Assembly:

1. One or more positive-displacement, direct-drive and hermetically sealed scroll compressor(s) with inverter drive and turndown to 15 percent of rated capacity.
2. Protection: Integral protection against the following:

    a. High refrigerant pressure.
    b. Low oil level.
    c. High oil temperature.
    d. Thermal and overload.
    e. Voltage fluctuations.
    f. Phase failure and phase reversal.
    g. Short cycling.

3. Speed Control: Variable to automatically maintain refrigerant suction and condensing pressures while varying refrigerant flow to satisfy system cooling and heating loads.
4. Vibration Control: Integral isolation to dampen vibration transmission.
5. Oil management system to ensure safe and proper lubrication over entire operating range.
6. Crankcase heaters with integral control to maintain safe operating temperature.

7. Fusible plug.

D. Condenser Coil Assembly:

1. Plate Fin Coils:

a. Casing: Aluminum, galvanized, or stainless steel.
b. Fins: Aluminum or copper, mechanically bonded to tubes, with arrangement required by performance.
c. Tubes: Copper, of diameter and thickness required by performance.

2. Aluminum Microchannel Coils:

a. Series of flat tubes containing a series of multiple, parallel-flow microchannels layered between refrigerant header manifolds.
b. Single- or multiple-pass arrangement.
c. Construct fins, tubes, and header manifolds of aluminum alloy.

3. Coating: Corrosion resistant.
4. Hail Protection: Provide condenser coils with louvers, baffles, or hoods to protect against hail damage.

E. Condenser Fan and Motor Assembly:

1. Fan(s): Propeller type.

a. Direct-drive arrangement.
b. Fabricated from non-ferrous components or ferrous components with corrosion protection finish to match performance indicated for condenser coil.
c. Statically and dynamically balanced.

2. Fan Guards: Removable safety guards complying with OSHA regulations. If using metal materials, coat with corrosion-resistant coating to match performance indicated for condenser coil.
3. Motor(s): Brushless dc or electronically commutated with permanently lubricated bearings and rated for outdoor duty.
4. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
5. Speed Settings and Control: Variable speed with a speed range of least 75 percent.
6. Vibration Control: Integral isolation to dampen vibration transmission.

F. Drain Pan: If required by manufacturer's design, provide unit with non-ferrous drain pan with bottom sloped to a low point drain connection.

G. Unit Controls:

1. Enclosure: Manufacturer's standard, and suitable for unprotected outdoor locations.
2. Factory-Installed Controller: Configurable digital control.
3. Factory-Installed Sensors:

a. Refrigerant suction temperature.
b. Refrigerant discharge temperature.

c. Outdoor air temperature.
d. Refrigerant high pressure.
e. Refrigerant low pressure.
f. Oil level.

4. Features and Functions: Self-diagnostics, time delay, auto-restart, fuse protection, auto operation mode , manual operation mode , night setback control.
5. Communication: Network communication with indoor units and other outdoor unit(s).
6. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
7. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.

H. Unit Electrical:

1. Enclosure: Metal, similar to enclosure, and suitable for unprotected outdoor locations.
2. Field Connection: Single point connection to power entire unit and integral controls.
3. Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4. Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5. Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6. Raceways: Enclose line voltage wiring in metal raceways to comply with NFPA 70.

I. Unit Hardware: Zinc-plated steel, or stainless steel. Coat exposed surfaces with additional corrosion-resistant coating if required to prevention corrosion when exposed to salt spray test for 1000 hours according ASTM B117.

J. Unit Piping:

1. Unit Tubing: Copper tubing with brazed joints.
2. Unit Tubing Insulation: Manufacturer's standard insulation, of thickness to prevent condensation.
3. Field Piping Connections: Manufacturer's standard.
4. Factory Charge: Dehydrated air or nitrogen.
5. Testing: Factory pressure tested and verified to be without leaks.

2.6 SYSTEM CONTROLS

A. General Requirements:

1. Network: Indoor units and outdoor units must include integral controls and connect through a manufacturer-selected control network.
2. Network Communication Protocol: open control communication between interconnected units.
3. Integration with Building Automation System: ASHRAE 135, BACnet IP and certified by BACnet Testing Lab (BTL), including the following:

a. Ethernet connection via RJ-45 connectors and port with transmission at 100 Mbps or higher.
b. Integration devices must be connected to local uninterruptible power supply unit(s) to provide at least 5 minutes of battery backup operation after a power loss.
c. Integration must include control and monitoring .

4. Operator Interface:

   a. Operators must interface with system and unit controls through the following:

      1) Operator interfaces integral to controllers.
      2) Integration with Building Automation System.

   b. Users must be capable of interface with controllers for indoor units control to extent privileges are enabled. Control features available to users must include the following:

      1) On/off control.
      2) Temperature set-point adjustment.

B. Wired Controllers for Indoor Units:

1. Single controller capable of controlling multiple indoor units as group.
2. Auto Timeout Touch Screen LCD: Timeout duration must be adjustable.
3. Multiple Language: English or Spanish.
4. Temperature Units: Fahrenheit.
5. On/Off: Turns indoor unit on or off.
6. Hold: Hold operation settings until hold is released.
7. Operation Mode: Cool, Heat, Auto, Dehumidification, Fan Only, and Setback.
8. Temperature Display: 1-degree increments.
9. Temperature Set-Point: Separate set points for Cooling, Heating, and Setback. Adjustable in 1-degree increments between 70-75.
10. Relative Humidity Display: 1 percent increments.
11. Relative Humidity Set-Point: Adjustable in 1 percent increments between 40-60% .
12. Fan Speed Setting: Select between available options furnished with the unit.
13. Airflow Direction Setting: If applicable to unit, select between available options furnished with the unit.
14. Seven-day programmable operating schedule with up to five events per day. Operations must include On/Off, Operation Mode, and Temperature Set-Point.
15. Auto Off Timer: Operates unit for an adjustable time duration and then turns unit off.
16. Occupancy detection.
17. Service Notification Display: "Filter" .
18. Service Run Tests: Limit use by service personnel to troubleshoot operation.
19. Error Code Notification Display: Used by service personnel to troubleshoot abnormal operation and equipment failure.
20. User and Service Passwords: Capable of preventing adjustments by unauthorized users.
21. Setting stored in nonvolatile memory to ensure that settings are not lost if power is lost. Battery backup for date and time only.
22. Low-voltage power required for controller must be powered through non-polar connections to indoor unit.

2.7 SYSTEM REFRIGERANT AND OIL

A. Refrigerant:

1. As required by VRF HVAC system manufacturer for system to comply with performance requirements indicated.
2. ASHRAE 34, Class A1 refrigerant classification.
3. R-410a.

B. Oil:

1. As required by VRF HVAC system manufacturer and to comply with performance requirements indicated.

2.8 SYSTEM CONDENSATE DRAIN PIPING

A. If more than one material is listed, material selection is Contractor's option.

B. Copper Tubing:

1. Drawn-Temper Tubing: According to ASTM B88, Type L or Type DWV according to ASTM B306.
2. Wrought-Copper Fittings: ASME B16.22.
3. Wrought-Copper Unions: ASME B16.22.
4. Solder Filler Metals: ASTM B32, lead-free alloys, and water-flushable flux according to ASTM B813.

C. CPVC plastic pipe according to ASTM F441/F441M, Schedule 40, with socket-type pipe fittings according to ASTM F438 and solvent cement according to ASTM F493.

2.9 SYSTEM REFRIGERANT PIPING

A. Comply with requirements in Section 232300 "Refrigerant Piping" for system piping requirements.

B. Divided-Flow Specialty Fittings: Where required by VRF HVAC system manufacturer for proper system operation, VRF HVAC system manufacturer must furnish specialty fittings with identification and instructions for proper installation by Installer.

C. Refrigerant Isolation Ball Valves:

1. Description: Uni-body full port design, rated for maximum system temperature and pressure, and factory tested under pressure to ensure tight shutoff. Designed for valve operation without removing seal cap.
2. Seals: Compatible with system refrigerant and oil. Seal service life of at least 20 years.
3. Valve Connections: Flare or sweat depending on size.

2.10 METAL HANGERS AND SUPPORTS

A. Copper Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

2. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized or copper-coated steel.

B. Plastic Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, galvanized-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel .

2.11 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flex-Strut Inc.
b. G-Strut.
c. MIRO Industries.
d. Thomas & Betts Corporation; A Member of the ABB Group.
e. Unistrut; Part of Atkore International.
f. Wesanco, Inc.
g. Or approved equal.

2. Description: Shop- or field-fabricated, pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel channel with inturned lips.
5. Channel Width: Selected for applicable load criteria.
6. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel for use indoors and of stainless steel for use outdoors.
8. Metallic Coating for Use Indoors: Hot-dip galvanized.
9. Plastic Coating for Use Outdoors: PVC.

2.12 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert/wedge type anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Indoor Applications: stainless steel.
2. Outdoor Applications: Stainless steel.

2.13 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. MIRO Industries.
    b. PHP Systems/Design.
    c. RectorSeal HVAC; a CSW Industrials Company.
    d. Rooftop Support Systems, a division of Eberl Iron Works, Inc.
    e. Or approved equal.

2. Description: Single base unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
3. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
4. Hardware: Galvanized steel or polycarbonate.
5. Accessories: Protection pads.

C. Low-Profile, Single-Base, Single-Pipe Stand:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. MIRO Industries.
    b. PHP Systems/Design.
    c. Rooftop Support Systems, a division of Eberl Iron Works, Inc.
    d. Or approved equal.

2. Description: Single base with vertical and horizontal members, and pipe support, for roof installation without membrane protection.
3. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
4. Vertical Members: Two, stainless-steel, continuous-thread 1/2-inch rods.
5. Horizontal Member: Adjustable horizontal, stainless steel pipe support channels.
6. Pipe Supports: Roller.
7. Hardware: Stainless steel.
8. Accessories: Protection pads.
9. Height: 12 inches above roof.

D. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.14 OUTDOOR EQUIPMENT STANDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. MIRO Industries.
2. RectorSeal HVAC; a CSW Industrials Company.
3. Rooftop Support Systems, a division of Eberl Iron Works, Inc.
4. Or approved equal.

B. Description: Individual foot supports with elevated adjustable channel cross bars and clamps/fasteners/bolts for ground or roof-supported outdoor equipment components, without roof membrane penetration, in a prefabricated system that can be modularly assembled on-site.

C. Foot Material: Rubber or polypropylene.

D. Rails Material: Hot-dip galvanized carbon steel.

E. Wind/Sliding Load Resistance: Up to 100 mph minimum.

2.15 MISCELLANEOUS SUPPORT MATERIALS

A. Grout: ASTM C1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

B. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; galvanized.

C. Threaded Rods: Continuously threaded. Zinc-plated steel or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar material as rods.

2.16 PIPING AND TUBING INSULATION

A. Comply with requirements in Section 230719 "HVAC Piping Insulation" for system piping insulation requirements.

2.17 SYSTEM CONTROL CABLE

A. Cable Rating: Listed and labeled for application according to NFPA 70.

1. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.

a. Flame Travel Distance: 60 inches or less.
b. Peak Optical Smoke Density: 0.5 or less.
c. Average Optical Smoke Density: 0.15 or less.

2. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
3. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

B. Low-Voltage Control Cabling:

1. Paired Cable: NFPA 70, Type CMG.

a. One pair, twisted, No. 16 AWG, stranded (19x29) or No. 18 AWG, stranded (19x30) tinned-copper conductors as required by VRF HVAC system manufacturer.

b. PVC insulation.
c. Braided or foil shielded.
d. PVC jacket.
e. Flame Resistance: Comply with UL 1685.

2. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

a. One pair, twisted, No. 16 AWG, stranded (19x29) or No. 18 AWG, stranded (19x30) tinned-copper conductors as required by VRF HVAC system manufacturer.
b. PVC insulation.
c. Braided or foil shielded.
d. PVC jacket.
e. NFPA 262 includes the standard flame-resistance test criteria in common use for cables and conductors.
f. Flame Resistance: Comply with NFPA 262.

C. TIA-485A Network Cabling:

1. Standard Cable: NFPA 70, Type CMG.

a. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned-copper conductors.
b. PVC insulation.
c. Unshielded.
d. PVC jacket.
e. Flame Resistance: Comply with UL 1685.

2. Plenum-Rated Cable: NFPA 70, Type CMP.

a. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
b. Fluorinated ethylene propylene insulation.
c. Unshielded.
d. Fluorinated ethylene propylene jacket.
e. NFPA 262 includes the standard flame-resistance test criteria in common use for cables and conductors.
f. Flame Resistance: NFPA 262.

D. Ethernet Network Cabling: TIA-568-C.2 Category 6a cable with RJ-45 connectors.

1. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of category cable indicated.
2. Conductors: 100-ohm, 23 AWG solid copper.
3. Shielding: Shielded twisted pairs (FTP).
4. Cable Rating: By application.
5. Jacket: White thermoplastic.

E. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems", 260533.16 "Boxes and Covers for Electrical Systems" and 260519 "Low-Voltage Electrical Power Conduits and Cables" for control wiring and cable raceways.

2.18 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

E. Comply with Section 230546 "Coatings for HVAC" for corrosion-resistant coating.

F. Corrosion-Resistant Coating: Coat with a corrosion-resistant coating capable of withstanding a 3000 -hour salt-spray test according to ASTM B117.

1. Standards:

a. ASTM B117 for salt spray.
b. ASTM D2794 for minimum impact resistance of 100 in-lb.
c. ASTM B3359 for cross-hatch adhesion of 5B.

2. Application: Immersion.
3. Thickness: 1 mil.
4. Gloss: Minimum gloss of 60 on a 60-degree meter.

2.19 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect factory-assembled equipment.

B. Equipment will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports for historical record. Submit reports only if requested.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine products before installation. Reject products that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for piping and tubing to verify actual locations of connections before equipment installation.

D. Examine roughing-in for ductwork to verify actual locations of connections before equipment installation.

E. Examine roughing-in for wiring and conduit to verify actual locations of connections before equipment installation.

F. Examine walls, floors, roofs, and outdoor pads for suitable conditions where equipment will be installed.

G. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 EQUIPMENT INSTALLATION, GENERAL

A. Clearance:

1. Maintain manufacturer's recommended clearances for service and maintenance.
2. Maintain clearances required by 2014 NYC Building codes.

B. Loose Components: Install components, devices, and accessories furnished by manufacturer, with equipment, that are not factory mounted.

1. Loose components must be installed by manufacturer's service representative.

3.4 INSTALLATION OF INDOOR UNITS

A. Install units to be level and plumb while providing a neat and finished appearance.

B. Unless otherwise required by VRF HVAC system manufacturer, support ceiling-mounted units from structure above using threaded rods; minimum rod size of 3/8 inch.

C. Adjust supports of exposed and recessed units to draw units tight to adjoining surfaces.

D. Protect finished surfaces of ceilings, floors, and walls that come in direct contact with units. Refinish or replaced damaged areas after units are installed.

E. In rooms with ceilings, conceal piping and tubing, controls, and electrical power serving units above ceilings.

F. In rooms without ceiling, arrange piping and tubing, controls, and electrical power serving units to provide a neat and finished appearance.

G. Provide lateral bracing if needed to limit movement of suspended units to not more than 0.25 inch.

H. For floor- and wall-mounted units that are exposed, conceal piping and tubing, controls, and electrical power serving units within walls.

I. Attachment: Install hardware for proper attachment to supported equipment.

J. Grouting: Place grout under equipment supports and make bearing surface smooth.

3.5 INSTALLATION OF OUTDOOR UNITS

A. Install units to be level and plumb while providing a neat and finished appearance.

B. Install outdoor units on support structures indicated on Drawings.

C. Roof-Mounted Installations: Install outdoor units on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, stainless-steel fasteners.

3.6 GENERAL REQUIREMENTS FOR PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping and tubing systems. Install piping and tubing as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping and tubing in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping and tubing at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping and tubing above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping and tubing to permit valve servicing.

F. Install piping and tubing at indicated slopes.

G. Install piping and tubing free of sags.

H. Install fittings for changes in direction and branch connections.

I. Install piping and tubing to allow application of insulation.

J. Install groups of pipes and tubing parallel to each other, spaced to permit applying insulation with service access between insulated piping and tubing.

K. Install sleeves for piping and tubing penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

3.7 INSTALLATION OF SYSTEM CONDENSATE DRAIN PIPING

A. General Requirements for Drain Piping and Tubing:

1. Install a union in piping at each threaded unit connection.
2. Install an adjustable stainless-steel hose clamp with adjustable gear operator on unit hose connections. Tighten clamp to provide a leak-free installation.
3. If required for unit installation, provide a trap assembly in drain piping to prevent air circulated through unit from passing through drain piping. Comply with more stringent of the following:

    a. Details indicated on Drawings.
    b. Manufacturer's requirements.
    c. The 2014 NYC Mechanical Code.
    d. In the absence of requirements, comply with ASHRAE requirements.

4. Extend drain piping from units with drain connections to drain receptors as indicated on Drawings. If not indicated on Drawings, terminate drain connection at nearest accessible location that is not exposed to view by occupants.
5. Provide each 90-degree change in direction with a Y- or T-fitting. Install a threaded plug connection in the dormant side of fitting or future use as a service cleanout.

B. Gravity Drains:

1. Slope piping from unit connection toward drain termination at a constant slope of not less than two percent.

C. Pumped Drains:

1. If unit condensate pump or lift mechanism is not included with an integral check valve, install a full-size check valve in each branch pipe near unit connection to prevent backflow into unit.

3.8 INSTALLATION OF HYDRONIC PIPING

A. Comply with requirements for hydronic pipe and tubing specified in Section 232113 "Hydronic Piping."

B. Comply with requirements for hydronic specialties specified in Section 232116 "Hydronic Piping Specialties."

C. Comply with requirements for ball valves specified in Section 230523.12 "Ball Valves for HVAC Piping."

D. Comply with requirements for butterfly valves specified in Section 230523.13 "Butterfly Valves for HVAC Piping."

E. Comply with requirements for check valves specified in Section 230523.14 "Check Valves for HVAC Piping."

F. Install continuous-thread hanger rods and spring hangers of size required to support equipment weight.

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC." Fabricate brackets or supports as required.
2. Comply with requirements for hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

G. Where installing piping and tubing adjacent to equipment, allow space for service and maintenance.

3.9 INSTALLATION OF REFRIGERANT PIPING

A. Refrigerant Tubing Kits:

1. Unroll and straighten tubing to suit installation. Deviations in straightness of exposed tubing must be unnoticeable to observer.
2. Support tubing using hangers and supports indicated at intervals not to exceed 5 feet. Minimum rod size, 1/4 inch.
3. Prepare tubing ends and make mating connections to provide a pressure tight and leak-free installation.

B. Install refrigerant piping according to ASHRAE 15 and Chapter 11 of the 2014 NYC Mechanical Code.

C. Select system components with pressure rating equal to or greater than system operating pressure.

D. Install piping as short and direct as possible, with a minimum number of joints and fittings.

E. Arrange piping to allow inspection and service of equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

F. Install refrigerant piping and tubing in protective conduit where installed belowground.

G. Install refrigerant piping and tubing in rigid or flexible conduit in locations where exposed to mechanical damage.

H. Unless otherwise required by VRF HVAC system manufacturer, slope refrigerant piping and tubing as follows:

1. Install horizontal hot-gas discharge piping and tubing with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps to entrain oil in vertical runs.
4. Liquid lines may be installed level.

I. When brazing, remove or protect components that could be damaged by heat.

J. Before installation, clean piping, tubing, and fittings to cleanliness level required by VRF HVAC system manufacturer.

K. Joint Construction:

1. Ream ends of tubes and remove burrs.
2. Remove scale, slag, dirt, and debris from inside and outside of tube and fittings before assembly.
3. Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

    a. Use Type BCuP (copper-phosphorus) alloy for joining copper fittings with copper tubing.
    b. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze.

3.10 INSTALLATION OF METAL HANGERS AND SUPPORTS

A. Comply with requirements in Section 230548.13 "Vibration Controls for HVAC" for seismic restraints.

B. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Comply with MFMA-103 for metal framing system selections and applications that are not specified.

E. Fastener System Installation:

1. Install powder-actuated fasteners, for use in lightweight concrete or concrete slabs less than 4 inches thick, in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
3. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel.

1. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Piping and Tubing Insulation:

1. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields must span an arc of 180 degrees.
2. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

N. Horizontal-Piping Hangers and Supports: Install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
3. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
4. Multiple horizontal pipes located indoors may use metal framing systems with split clamp attachment for each pipe in lieu if individual clevis hangers.
5. Pipe stands for horizontal pipes located outdoors.
6. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
7. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

O. Horizontal Piping Hanger Spacing and Rod Size: Install hangers for drawn-temper copper piping with the following maximum horizontal spacing and minimum rod sizes:

1. Sizes through NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/4: Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
6. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
7. NPS 3 and Larger: Maximum span, 10 feet; minimum rod size, 3/8 inch.

P. Plastic Pipe Hanger and Support Spacing:

1. Space hangers and supports according to pipe manufacturer's written instructions for service conditions.

2. Maximum spacing, 5 feet; minimum rod size, 1/4 inch.

Q. Vertical-Piping Clamps: Install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): If longer ends are required for riser clamps.

R. Support vertical runs at roof, at each floor, and at midpoint intervals between floors, not to exceed 10 feet.

S. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified.

T. Use hangers, supports, and attachments with galvanized coatings unless otherwise indicated.

U. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

V. Trim excess length of continuous-thread hanger and support rods to 1 inch.

W. Hanger-Rod Attachments: Install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

X. Building Attachments: Install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

3.11 INSTALLATION OF PIPING AND TUBING INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated. Installation to maintain a continuous vapor barrier.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are unavailable, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

E. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.12 ELECTRICAL INSTALLATION

A. Comply with requirements indicated on Drawings and in applicable Division 26 Sections.

B. To extent electrical power is required for system equipment, components, and controls, and is not indicated on Drawings and addressed in the Specifications, the design for such electrical power must be performed by VRF HVAC system provider.

1. Engineering calculations of electrical power to equipment, components and controls, and associated installation must be included at no additional cost to City of New York.

C. Connect field electrical power source to each separate electrical device requiring field electrical power. Coordinate termination point and connection type with Installer.

D. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

E. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding connections.

F. Install nameplate or acrylic label with self-adhesive back for each electrical connection indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated phenolic layers of black with engraved white letters. Letters at least 1/2 inch high.
2. Locate nameplate or label where easily visible.

G. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" and 260533.16 "Boxes and Covers for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or revised in this Section.

1. Outlet boxes must be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.
2. Outlet boxes for cables must be no smaller than 4 inches square by 1-1/2 inches deep with extension ring sized to bring edge of ring to within 1/8 inch of the finished wall surface.
3. Flexible metal conduit must not be used.

H. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.

I. Install manufactured conduit sweeps and long-radius elbows if possible.

J. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.13 SOFTWARE

A. Cybersecurity:

1. Software:

a. Coordinate security requirements with the Commissioner.
b. Ensure that latest stable software release is installed and properly operating.
c. Disable or change default passwords to password using a combination of uppercase and lower letters, numbers, and symbols at least eight characters in length. Record passwords and turn over to party responsible for system operation and administration.

2. Hardware:

a. Coordinate location and access requirements with the Commissioner.

b. Enable highest level of wireless encryption that is compatible with the City of New York's ICT network.
c. Disable dual network connections.

3.14 INSTALLATION OF SYSTEM CONTROL CABLE

A. Comply with NECA 1.

B. Installation Method:

1. Install cables in raceways except as follows:

a. Within equipment and associated control enclosures.

2. Conceal raceway and cables except in unfinished spaces.

C. General Requirements for Cabling:

1. Comply with TIA-568-C Series of standards.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Terminate all conductors; no cable must contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced and must be continuous from terminal to terminal. Do not splice cable.
5. Cables serving a common system may be grouped in a common raceway. Install control cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
6. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
11. Support: Do not allow cables to lie on removable ceiling tiles or access panels.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals.
15. Do not bend cables in a radius less than 10 times the cable OD.
16. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
17. Ground wire must be copper, and grounding methods must comply with IEEE C2. Demonstrate ground resistance.

D. Balanced Twisted-Pair Cable Installation:

1. Comply with TIA-568-C.2.
2. Do not untwist balanced twisted-pair cables more than 1/2 inch at the point of termination to maintain cable geometry.

E. Open-Cable Installation:

1. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
2. Cable must not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

F. Separation from EMI Sources: Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded cable from potential EMI sources including electrical power wiring and equipment.

3.15 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.16 GROUNDING INSTALLATION

A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

B. For low-voltage control cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.17 IDENTIFICATION

A. Identify system equipment, piping, tubing, and valves. Comply with requirements for identification specified in Section 230553 "Identification for HVAC Piping and Equipment."

B. Identify system electrical and controls components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify each control cable on each end and at each terminal with a number-coded identification tag. Each cable must have a unique tag.

3.18 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage VRF HVAC system manufacturer's service representative to advise and assist installers; witness testing; and observe and inspect components, assemblies, and equipment installations, including controls and connections.

1. Field service must be performed by a factory-trained and -authorized service representative of VRF HVAC system manufacturer whose primary job responsibilities are to provide direct technical support of its products.
2. Manufacturer must provide on-site visits during the course of construction at installation milestones indicated. System Installer must coordinate each visit in advance to give manufacturer sufficient notice to plan the visit.

    a. First Visit: Kick-off meeting.
    b. Second Visit: At approximately 50 percent completion of system(s).
    c. Final Visit: Final inspection before system startup.

3. Kick-off Meeting:

    a. Meeting must include system Installer and other related trades with sole purpose of reviewing VRF HVAC system installation requirements and close coordination required to make a successful installation.
    b. Meeting must be held at Project site and scheduled at a mutually agreed to time that occurs before the start of any part of system installation.
    c. Meeting must cover the following as a minimum requirement:

        1) Review of latest issue of Contract Documents, Drawings, and Specifications, relevant to VRF HVAC systems.
        2) Manufacturer's installation requirements specific to systems being installed.
        3) Review of all relevant VRF HVAC system submittals, including engineering services submittals.
        4) Required field activities related installation of VRF HVAC system.
        5) Project team communication protocol, contact information, and exchange of responsibilities for each party involved, including manufacturer, supplier, system Installer, and other related trades.

4. Site Visits: Activities for each site visit must include the following:

    a. Meet with VRF HVAC system Installer to discuss field activities, issues, and suggested methods to result in a successful installation.
    b. Offer technical support to Installer and related trades as related to VRF system(s) being installed.
    c. Review progress of VRF HVAC system(s) installation for strict compliance with manufacturer's requirements.
    d. Advise and if necessary assist Installer with updating related refrigerant calculations and system documentation.
    e. Issue a report for each visit, documenting the visit.

        1) Report to include name and contact information of individual making the visit.
        2) Date(s) and time frames while on-site.
        3) Names and contact information of people meeting with while on-site.

4) Clearly identify and list each separate issue that requires resolution. For each issue, provide a unique identification number, relevant importance, specific location or equipment identification, description of issue, recommended corrective action, and follow-up requirements needed. Include a digital photo for clarification if deemed to be beneficial.

5. Final Inspection before Startup:

a. Before inspection, Installer to provide written request to manufacturer stating the system is fully installed according manufacturer's requirements and ready for final inspection.
b. All system equipment and operating components must be inspected. If components are inaccessible for inspection, they must be made accessible before the final inspection can be completed.
c. Manufacturer must provide a comprehensive inspection of all equipment and each operating component that comprise the complete system(s). Inspection must follow a detailed checklist specific to each equipment and operating component.
d. Inspection reports for indoor units must include, but not be limited to, the following:

1) Unit designation on Drawings.
2) Manufacturer model number.
3) Serial number.
4) Network address, if applicable.
5) Each equipment setting.
6) Mounting, supports, and restraints properly installed.
7) Proper service clearance provided.
8) Wiring and power connections correct.
9) Line-voltage reading(s) within acceptable range.
10) Wiring and controls connections correct.
11) Low-voltage reading(s) within an acceptable range.
12) Controller type and model controlling unit.
13) Controller location.
14) Temperature settings and readings within an acceptable range.
15) Humidity settings and readings within an acceptable range.
16) Condensate removal acceptable.
17) Fan settings and readings within an acceptable range.
18) Unit airflow direction within an acceptable range.
19) If applicable, fan external static pressure setting.
20) Filter type and condition acceptable.
21) Noise level within an acceptable range.
22) Refrigerant piping properly connected and insulated.
23) Condensate drain piping properly connected and insulated.
24) If applicable, ductwork properly connected.
25) If applicable, external interlocks properly connected.
26) Remarks.

e. Inspection reports for outdoor units must include, but not be limited to, the following:

1) Unit designation on Drawings.
2) Manufacturer model number.

3) Serial number.
4) Network address, if applicable.
5) Each equipment setting.
6) Mounting, supports, and restraints properly installed.
7) Proper service clearance provided.
8) Wiring and power connections correct.
9) Line-voltage reading(s) within acceptable range.
10) Wiring and controls connections correct.
11) Low-voltage reading(s) within an acceptable range.
12) Condensate removal acceptable.
13) Noise level within an acceptable range.
14) Refrigerant piping properly connected and insulated.
15) Condensate drain piping properly connected and insulated.
16) Remarks.

f. Installer must provide manufacturer with the requested documentation and technical support during inspection.
g. Installer must correct observed deficiencies found by the inspection.
h. Upon completing the on-site inspection, manufacturer must provide a written report with complete documentation describing each inspection step, the result, and any corrective action required.
i. If corrective action is required by Installer that cannot be completed during the same visit, provide additional visits, as required, until deficiencies are resolved and systems are deemed ready for startup.
j. Final report must indicate the system(s) inspected are installed according to manufacturer's requirements and are ready for startup.

B. Perform the following tests and inspections with the assistance of manufacturer's service representative:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Refrigerant Tubing Positive Pressure Testing:

1. Comply with more stringent of VRF HVAC system manufacturer's requirements and requirements indicated.
2. After completion of tubing installation, pressurize tubing systems to a test pressure of not less than 1.5 times VRF HVAC system operating pressure, but not less than 600 psig, using dry nitrogen.
3. Successful testing must maintain a test pressure for a continuous and uninterrupted period of 24 hours. Allowance for pressure changes attributed to changes in ambient temperature are acceptable.
4. Prepare test report to record the following information for each test:

a. Name of person starting test, company name, phone number, and e-mail address.

b. Name of manufacturer's service representative witnessing test, company name, phone number, and e-mail address.
c. Detailed description of extent of tubing tested.
d. Date and time at start of test.
e. Test pressure at start of test.
f. Outdoor temperature at start of test.
g. Name of person ending test, company name, phone number, and e-mail address.
h. Date and time at end of test.
i. Test pressure at end of test.
j. Outdoor temperature at end of test.
k. Remarks:

5. Submit test reports for Project record.

D. Refrigerant Tubing Evacuation Testing:

1. Comply with more stringent of VRF HVAC system manufacturer's requirements and requirements indicated.
2. After completion of tubing positive-pressure testing, evacuate tubing systems to a pressure of 500 microns.
3. Successful testing must maintain a test pressure for a continuous and uninterrupted period of one hour(s) with no change.
4. Prepare test report to record the following information for each test:

a. Name of person starting test, company name, phone number, and e-mail address.
b. Name of manufacturer's service representative witnessing test, company name, phone number, and e-mail address.
c. Detailed description of extent of tubing tested.
d. Date and time at start of test.
e. Test pressure at start of test.
f. Outdoor temperature at start of test.
g. Name of person ending test, company name, phone number, and e-mail address.
h. Date and time at end of test.
i. Test pressure at end of test.
j. Outdoor temperature at end of test.
k. Remarks:

5. Submit test reports for Project record.
6. Upon successful completion of evacuation testing, system must be charged with refrigerant.

E. System Refrigerant Charge:

1. Using information collected from the refrigerant tubing evacuation testing, system Installer must consult variable refrigerant system manufacturer to determine the correct system refrigerant charge.
2. Installer must charge system following VRF HVAC system manufacturer's written instructions.
3. System refrigerant charging must be witnessed by system manufacturer's representative.
4. Total refrigerant charge must be recorded and permanently displayed at the system's outdoor unit.

F. Products will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports.

3.19 STARTUP SERVICE

A. Engage a VRF HVAC system manufacturer's service representative to perform system(s) startup service.

1. Service representative must be a factory-trained and -authorized service representative of VRF HVAC system manufacturer.
2. Complete startup service of each separate system.
3. Complete system startup service according to manufacturer's written instructions.

B. Startup checks must include, but not be limited to, the following:

1. Check control communications of equipment and each operating component in system(s).
2. Check each indoor unit's response to demand for cooling and heating.
3. Check each indoor unit's response to changes in airflow settings.
4. Check each indoor unit and outdoor unit for proper condensate removal.
5. Check sound levels of each indoor and outdoor unit.

C. Installer must accompany manufacturer's service representative during startup service and provide manufacturer's service representative with requested documentation and technical support during startup service.

1. Installer must correct deficiencies found during startup service for reverification.

D. System Operation Report:

1. After completion of startup service, manufacturer must issue a report for each separate system.
2. Report must include complete documentation describing each startup check, the result, and any corrective action required.
3. Manufacturer must electronically record not less than two hours of continuous operation of each system and submit with report for historical reference.

a. All available system operating parameters must be included in the information submitted.

E. Witness:

1. Invite Commissioner to witness startup service procedures.
2. Provide written notice not less than 20 business days before start of startup service.

3.20 ADJUSTING

A. Adjust equipment and components to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature and humidity set points. Adjust initial airflow settings and discharge airflow patterns.

C. Set field-adjustable switches and circuit-breaker trip ranges according to VRF HVAC system manufacturer's written instructions, and as indicated.

D. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.21 PROTECTION

A. Protect products from moisture and water damage. Remove and replace products that are wet, moisture damaged, or mold damaged.

B. Protect equipment from physical damage. Replace equipment with physical damage that cannot be repaired to new condition. Observable surface imperfections must be grounds for removal and replacement.

C. Protect equipment from electrical damage. Replace equipment suffering electrical damage.

D. Cover and seal openings of equipment to keep inside of equipment clean. Do not remove covers until finish work is complete.

3.22 DEMONSTRATION

A. Engage a VRF HVAC system manufacturer's factory-authorized service representative to instruct City of New York's personnel to adjust and operate entire system.

B. Instructor:

1. Instructor must be factory trained and certified by VRF HVAC system manufacturer with current instruction on the system(s), equipment, and controls that are installed.
2. Instructor's credentials must be submitted for review by Commissioner before scheduling instruction.

C. Schedule and Duration:

1. Schedule instruction at least 20 business days before first session.
2. Instruction must occur before occupancy.
3. Instruction must be held at mutually agreed date and time, and on-site location during normal business hours.
4. Each instruction day must not exceed seven hours of instruction. Daily schedule must allow time for one hour lunch period and 15 -minute break after every two hours of instruction.
5. Perform not less than 16 total hours of instruction.

D. Attendees: Assume three people to be determined at time of Demonstration by the Commissioner.

E. Format: Individual modules must include classroom instruction followed by hands-on field demonstration.

F. Materials: Provide instruction materials in electronic format to each attendee.

1. Include instructional videos that are coordinated with operation and maintenance manuals.

G. Video record each instruction session and submit an electronic copy to Commissioner.

H. Acceptance: Obtain Commissioner written acceptance that instruction is complete and requirements indicated have been satisfied.

END OF SECTION 238129

SECTION 238216.11 - HYDRONIC AIR COILS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hydronic air coils.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil.
2. Include rated capacities, operating characteristics, and pressure drops for each air coil.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

C. Coordination Drawings: Floor plans, sections, and other details, or BIM model, drawn to scale, showing the items described in this Section and coordinated with all other project Subcontractors.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air coils to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. ASHRAE 62.1 Compliance: Comply with applicable requirements in ASHRAE 62.1, Section 5, "Systems and Equipment," and Section 7, "Construction and Startup."

B. Performance Ratings: Tested and rated in accordance with AHRI 410 and ASHRAE 33.

C. Minimum Working-Pressure/Temperature Ratings: 200 psig/300 deg F.

D. Select cooling coils for no moisture carryover at design conditions. Provide moisture eliminators on discharge face of cooling coil if necessary to eliminate moisture carryover.

2.2 HYDRONIC AIR COILS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aerofin.
2. Coil Company, LLC.
3. Colmac Coil Manufacturing, Inc.
4. Modine Commercial and Industrial Solutions.
5. RAE Coils; a division of RAE Corporation.
6. USA Coil & Air.
7. Or approved equal.

B. Source Limitations: Obtain hydronic coils from single source from single manufacturer.

C. Description: Coils constructed of staggered tubes mechanically expanded into continuous collars that are die-formed into the coil fins; self-venting; counterflow design of air to fluid.

D. Tubes:

1. Material: Copper.
2. Nominal Diameter: Minimum 1/2 inch before expanding, selected to provide performance indicated.
3. Nominal Wall Thickness: As required by performance, minimum 0.020 inch thick.
4. Return Bends: 180-degree bends; material, wall thickness, and nominal diameter to match tubes.
5. Fluid Velocity at Design Flow Rate:

    a. Maximum: 6 fps.
    b. Minimum: 3 fps.

6. Features: Cleanable.

E. Fins:

1. Type: Plate.

2. Materials:

    a. Aluminum: 0.0060 inch thick.

3. Spacing: Maximum 12 fins per inch.
4. Collars: Full collars for accurate fin spacing and maximum tube contact while leaving no surface of tube exposed.
5. Configuration: Wave-face, corrugated-face, or waffle-face fins.
6. Fin and Tube Joint: Mechanical bond.

F. Headers:

1. Material: Copper.
2. Tube-to-Header Connections: Tube-to-header holes to intrude inward, so landed surface area is 3 times the core tube thickness, to provide enhanced-header-to-tube joint integrity. Evenly extend tubes within the ID of the header no more than 0.12 inch.
3. Header Top and Bottom Caps: End caps to be die-formed and installed on the ID of header, such that the landed surface area is 3 times the header wall thickness.
4. Drains: Include low point of supply and return header with a NPS 1/2 (DN 13) drain connection.
5. Vents: Include high point of supply and return header with a NPS 1/2 (DN 13) vent connection.
6. Supply and Return Connections: Copper pipe; flanged, opposite ends of coil.
7. Protect opening of supply, return, vent, and drain connections with a threaded cap to prevent entry of dirt into coil.
8. Fluid Velocity at Design Flow Rate: Maximum of 6 fps (1.8 m/s).

G. Casings and Tube Sheets:

1. Depth: Extend coil casing and tube sheets a minimum of 1/2 inch beyond face of fins on both entering and leaving sides.
2. Materials:

    a. Stainless steel, Type 304, No. 2D finish, ASTM A240/A240M.

H. Top and Bottom Casings:

1. Flange face minimum of 1-1/2 inches; double-flange edge for rigidity and ease of removal with secondary flange face minimum of 1/2 inch.
2. Thickness:

    a. Coils with Fin Length of Up to 72 Inches: Minimum of 16 gauge thick.
    b. Coils with Fin Length Exceeding 72 Inches: Minimum of 16 gauge thick.

I. End Tube Sheets:

1. Tube sheet holes rolled to prevent chaffing of tubes during thermal expansion and contraction.
2. Flange face minimum of 1-1/2 inches.
3. Thickness: Minimum of 16 gauge thick.

J. Intermediate Tube Sheets:

1. Tube sheet holes rolled to prevent chaffing of tubes during thermal expansion and contraction.
2. Space intermediate tube sheets a maximum of 48 inches o.c. and locate to provide equal spacing between tube sheet across coil tube length.
3. Flange face minimum of 1/2 inch.
4. Thickness: Minimum of 16 gauge thick.

K. Holes: Include number, size, and location of holes in casing and end tube sheets required for coil installation.

L. Hardware: Use hex-head bolts, nuts, and washers constructed of Type 304 stainless steel.

M. Nameplate: Aluminum or stainless steel nameplate with brass or stainless steel chain for each coil, with the following data engraved or embossed:

1. Manufacturer name, address, telephone number, and website address.
2. Manufacturer model number.
3. Serial number.
4. Manufacturing date.
5. Coil identification (indicated on Drawings).
6. Coil fin length.
7. Coil fin height.
8. Coil weight with fluid/without fluid.
9. Coil casing material and thickness.
10. Coil fin material and thickness.
11. Coil tube material and thickness.
12. Coil header material and thickness.

N. Comply with Section 230546 "Coatings for HVAC" for corrosion-resistant coating. See Drawings for coils requiring a corrosion-resistant coating.

O. Coating: None.

2.3 MATERIALS

A. Aluminum: ASTM B209.

B. Copper Tube: ASTM B75/ASTM 75M annealed temper or ASTM B280 drawn temper.

C. Copper Sheet: ASTM B152.

D. 90/10 Cupronickel Alloy: ASTM B122/ASTM B122M.

E. Steel:

1. Pipe Connections: ASTM A53/A53M.

F. Corrosion-Resistant Coating: Where indicated on Drawings, coat coils with a corrosion-resistant coating capable of withstanding a 3000 -hour salt-spray test in accordance with ASTM B117.

1. Standards:

   a. ASTM B117 for salt spray.
   b. ASTM D2794 for minimum impact resistance of 100 in. lb.
   c. ASTM D3359 for cross-hatch adhesion of 5B.

2. Application: Immersion.
3. Thickness: 1 mil.
4. Gloss: Minimum gloss of 60 on a 60-degree meter.

2.4 SOURCE QUALITY CONTROL

A. Hydronic Coils: Factory tested with air while coil is completely submerged underwater to design pressure indicated, but not less than 300-psig internal pressure.

B. Coils to display a tag with inspector's identification as proof of testing.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine ducts, plenums, and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before coil installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install coils level and plumb.

B. Install coils in metal ducts and casings constructed in accordance with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

C. Install stainless steel drain pan under each cooling coil.

1. Construct drain pans with connection for drain; insulated and complying with ASHRAE 62.1.
2. Construct drain pans to extend beyond coil length and width and to connect to condensate trap and drainage.
3. Extend drain pan upstream and downstream from coil face.

4. Extend drain pan under coil headers and exposed supply piping.

D. Install moisture eliminators for cooling coils. Extend drain pan under moisture eliminator.

E. Straighten bent fins on air coils.

F. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

3.4 PIPING CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to coils to allow service and maintenance.

C. Connect water piping with unions and shutoff valves to allow coils to be disconnected without draining piping. Control valves are specified in Section 230923.11 "Control Valves," and other piping specialties are specified in Section 232116 "Hydronic Piping Specialties."

END OF SECTION 238216.11

SECTION 238219 - FAN COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Ducted fan coil units and accessories.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."
2. Ventilation: Product Data for ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."

C. Shop Drawings:

1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of fan coil unit indicated.

F. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which fan coil units will be attached.
3. Method of attaching hangers to building structure.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.

6. Perimeter moldings.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For fan coil units, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fan coil units to include in emergency, operation, and maintenance manuals.

1. In addition to items as required by DDC General Conditions, include the following:

    a. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Comply with NFPA 70.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.8 COORDINATION

A. Coordinate layout and installation of fan coil units and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

B. Coordinate size and location of wall sleeves for outdoor-air intake.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-packaged and -tested units rated according to AHRI 440, ASHRAE 33, and UL 1995.

2.2 DUCTED FAN COIL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dunham-Bush.
2. ENVIRO-TEC; by Johnson Controls, Inc.
3. IEC (International Environmental Corporation); LSB Industries.
4. USA Coil & Air.
5. Or approved equal.

B. Fan Coil Unit Configurations: Row split.

1. Number of Heating Coils: One with two-pipe system.
2. Number of Cooling Coils: One with four-pipe system.

C. Coil Section Insulation: 1/2-inch- thick, foil-faced glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

1. Surface-Burning Characteristics: Insulation and adhesive must have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.
2. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.

D. Coil Section Insulation: Insulate coil section according to Section 230716 "HVAC Equipment Insulation."

1. Surface-Burning Characteristics: Insulation and adhesive must have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.

2. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.

E. Main and Auxiliary Drain Pans: Stainless steel. Fabricate pans and drain connections to comply with ASHRAE 62.1.

F. Chassis: Galvanized steel where exposed to moisture, with powder-coat finish and removable access panel. Floor-mounting units must have leveling screws.

G. Cabinets: Steel with baked-enamel finish in manufacturer's standard paint color.

1. Supply-Air Plenum: Sheet metal plenum finished and insulated to match the chassis with mill-finish, aluminum, double-deflection grille.
2. Return-Air Plenum: Sheet metal plenum finished to match the chassis.
3. Dampers: Galvanized steel with extruded-vinyl blade seals, flexible-metal jamb seals, and interlocking linkage.

H. Filters: Minimum arrestance and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2 and all addendums.

I. MERV Rating: 8 when tested according to ASHRAE 52.2.

1. Pleated Cotton-Polyester Media: 90 percent arrestance and MERV 8.

J. Hydronic Coils: Copper tube with corrosion-resistant coating, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain.

K. Corrosion-Resistant Coating: Coat coils and fan guards with a corrosion-resistant coating capable of withstanding a 3,000 -hour salt-spray test according to ASTM B 117.

1. Standards:

a. ASTM B 117 for salt spray.
b. ASTM D 2794 for minimum impact resistance of 100 in-lb
c. ASTM D-3359 for cross hatch adhesion of 5B.

2. Application: Immersion.
3. Thickness: 1 mil.
4. Gloss: Minimum gloss of 50 gloss units on a single angle 60 degree meter.
5. UV Protection: Spray applied topcoat.

L. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.

1. Motors: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

M. Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the cabinet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.

1. Motors: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

N. Factory, Hydronic Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.

1. Two-way, modulating control valve for chilled-water coil.
2. Two-way, modulating control valve for heating coil.
3. Hose Kits: Minimum 400-psig working pressure and operating temperatures from 33 to 211 deg F. Tag hose kits to equipment designations.

    a. Length: 36 inches.
    b. Minimum Diameter: Equal to fan coil unit connection size.

4. Two-Piece Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 600-psig minimum CWP rating and blowout-proof stem.
5. Calibrated-Orifice Balancing Valves: Bronze body, ball type; 125-psig working pressure, 250 deg F maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and a memory stop to retain set position.
6. Automatic Flow-Control Valve: Brass or ferrous-metal body; 300-psig working pressure at 250 deg F; with removable, corrosion-resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of 2 to 80 psig.
7. Y-Pattern Hydronic Strainers: Cast-iron body (ASTM A 126, Class B); 125-psig working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum NPS 1/2 hose-end, full-port, ball-type blowdown valve in drain connection.
8. Wrought-Copper Unions: ASME B16.22.

O. Control devices and operational sequence are specified in Section 230548.13 "Vibration Controls for HVAC Piping and Equipment."

P. Basic Unit Controls:

1. Control voltage transformer.
2. Wall-mounting thermostat with the following features.

    a. Heat-cool-off switch.
    b. Fan on-auto switch.
    c. Fan-speed switch.
    d. Automatic changeover.
    e. Adjustable deadband.
    f. Exposed set point.
    g. Exposed indication.
    h. Degree F indication.

3. Wall-mounting humidistat.

    a. Concealed set point.
    b. Concealed indication.

4. Wall-mounting temperature sensor.
5. Unoccupied-period-override push button.
6. Data entry and access port.

    a. Input data includes room temperature, and humidity set points and occupied and unoccupied periods.
    b. Output data includes room temperature and humidity, supply-air temperature, entering-water temperature, operating mode, and status.

Q. Direct Digital Control Terminal Controller:

1. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
2. Unoccupied-Period-Override Operation: Two hours.
3. Unit Supply-Air Fan Operation:

    a. Occupied Periods: Fan runs continuously.
    b. Unoccupied Periods: Fan cycles to maintain room setback temperature.

4. Heating-Coil Operation:

    a. Occupied Periods: Modulate control valve to provide heating if room temperature falls below thermostat set point.
    b. Unoccupied Periods: Start fan and modulate control valve if room temperature falls below setback temperature.

5. Controller must have volatile-memory backup.

R. Interface with Direct Digital Control System for HVAC Requirements:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation.
3. Provide BACnet interface for central Direct Digital Control system for HVAC workstation for the following functions:

    a. Adjust set points.
    b. Fan coil unit start, stop, and operating status.
    c. Data inquiry, including supply- and room-air temperature.
    d. Occupied and unoccupied schedules.

S. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, to receive fan coil units for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping and electrical connections to verify actual locations before fan coil unit installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install fan coil units level and plumb.

B. Install fan coil units to comply with NFPA 90A.

C. Suspend fan coil units from structure with elastomeric hangers. Vibration isolators are specified in Section 230548.13 "Vibration Controls for HVAC Piping and Equipment."

D. Verify locations of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above finished floor.

E. Install new filters in each fan coil unit within two weeks after Substantial Completion.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Install piping adjacent to machine to allow service and maintenance.
2. Connect piping to fan coil unit factory hydronic piping package. Install piping package if shipped loose.
3. Connect condensate drain to indirect waste.

    a. Install condensate trap of adequate depth to seal against fan pressure. Install cleanouts in piping at changes of direction.

B. Connect supply-air and return-air ducts to fan coil units with flexible duct connectors specified in Section 233300 "Air Duct Accessories." Comply with safety requirements in UL 1995 for duct connections.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate fan coil units.

END OF SECTION 238219

SECTION 238236 - FINNED-TUBE RADIATION HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes hydronic , baseboard finned-tube radiation heaters.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Indicate location and arrangement of piping valves and specialties.
2. Indicate location and arrangement of integral controls.
3. Include enclosure joints, corner pieces, access doors, and other accessories.

C. Samples: For each exposed product and for each color and texture specified.

D. Color Samples for Initial Selection: For finned-tube radiation heaters with factory-applied color finishes.

E. Color Samples for Verification: For each type of exposed finish.

F. Coordination Drawings: Floor plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 HOT-WATER BASEBOARD RADIATION HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Rosemex Products.
2. Slant/Fin Corp.
3. Sterling HVAC Products; a Mestek company.
4. Or approved equal.

B. Performance Ratings: Rate baseboard radiation heaters according to Hydronics Institute's "I=B=R Testing and Rating Standard for Baseboard Radiation."

C. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins resting on polypropylene element glides. One end of tube must be belled.

D. Enclosures: Minimum 0.0329-inch- thick steel, removable front cover.

1. Full-height back.
2. Full-length damper.
3. End panel.
4. End caps.
5. Inside and outside corners.
6. Valve access door.
7. Joiner pieces to snap together.
8. Finish: Baked-enamel finish in manufacturer's custom color as selected by Commissioner.
9. Element Brackets: Primed and painted steel to support front panel and element.

2.2 HOT-WATER FINNED-TUBE RADIATION HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Rosemex Products.
2. Slant/Fin Corp.
3. Sterling HVAC Products; a Mestek company.
4. Or approved equal.

B. Performance Ratings: Rate finned-tube radiation heaters according to Hydronics Institute's "I=B=R Testing and Rating Standard for Finned-Tube (Commercial) Radiation."

C. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins resting on element supports. One end of tube must be belled.

D. Element Supports: Ball-bearing cradle type to permit longitudinal movement on enclosure brackets.

E. Front Panel: Minimum 0.0528-inch- thick steel.

F. Wall-Mounted Back Panel: Minimum 0.0329-inch- thick steel, full height, with full-length channel support for front panel without exposed fasteners.

G. Floor-Mounted Pedestals: Conceal insulated piping at maximum 36-inch spacing. Pedestal-mounted back panel must be solid panel matching front panel. Provide stainless-steel escutcheon for floor openings at pedestals.

H. Support Brackets: Locate at maximum 36-inch spacing to support front panel and element.

I. Finish: Baked-enamel finish in manufacturer's custom color as selected by Commissioner.

J. Damper: Knob-operated internal damper at enclosure outlet.

K. Access Doors: Factory made, permanently hinged with tamper-resistant fastener, minimum size 6 by 7 inches, integral with enclosure.

L. Enclosure Style: Flat top.

1. Front Inlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.

    a. Anodized finish, color as selected by Commissioner from manufacturer's custom colors.

2. Top Outlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.

    a. Anodized finish, color as selected by Commissioner from manufacturer's custom colors.

M. Accessories: Filler sections, corners, relay sections, and splice plates all matching the enclosure and grille finishes.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive finned-tube radiation heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for hydronic-piping connections to verify actual locations before installation of finned-tube radiation heaters.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 BASEBOARD RADIATION HEATER INSTALLATION

A. Install units level and plumb.

B. Install enclosure continuously around corners, using outside and inside corner fittings.

C. Join sections with splice plates and filler pieces to provide continuous enclosure.

D. Install access doors for access to valves.

E. Install enclosure continuously from wall to wall.

F. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.

G. Install valves within reach of access door provided in enclosure.

H. Install air-seal gasket between wall and recessed flanges or front cover of fully recessed unit.

I. Install piping within pedestals for freestanding units.

3.4 FINNED-TUBE RADIATION HEATER INSTALLATION

A. Install units level and plumb.

B. Install enclosure continuously around corners, using outside and inside corner fittings.

C. Join sections with splice plates and filler pieces to provide continuous enclosure.

D. Install access doors for access to valves.

E. Install enclosure continuously from wall to wall.

F. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.

G. Install valves within reach of access door provided in enclosure.

H. Install air-seal gasket between wall and recessed flanges or front cover of fully recessed unit.

I. Install piping within pedestals for freestanding units.

3.5 CONNECTIONS

A. Piping installation requirements are specified in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect hot-water finned-tube radiation heaters and components to piping according to Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties."

1. Install shutoff valves on inlet and outlet, and balancing valve on outlet.

C. Install control valves as required by Section 230923.11 "Control Valves."

D. Install piping adjacent to finned-tube radiation heaters to allow service and maintenance.

3.6 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Units will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 238236

SECTION 238239.13 - CABINET UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes cabinet unit heaters with centrifugal fans and hot-water coils.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. DDC: Direct digital control.

C. PTFE: Polytetrafluoroethylene plastic.

D. TFE: Tetrafluoroethylene plastic.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

C. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include location and size of each field connection.
4. Include details of anchorages and attachments to structure and to supported equipment.

5. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
6. Indicate location and arrangement of piping valves and specialties.
7. Indicate location and arrangement of integral controls.
8. Wiring Diagrams: Power, signal, and control wiring.

D. Samples: For each exposed product and for each color and texture specified.

E. Samples for Initial Selection: Finish colors for units with factory-applied color finishes.

F. Samples for Verification: Finish colors for each type of cabinet unit heater indicated with factory-applied color finishes.

G. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which cabinet unit heaters will be attached.
3. Method of attaching hangers to building structure.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.

6. Perimeter moldings for exposed or partially exposed cabinets.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Submit certification that cabinet unit heaters, accessories, and components will withstand seismic forces defined in Section 230548.13 "Vibration Controls for HVAC." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Include detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For cabinet unit heaters to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Berko; Marley Engineered Products.
2. Dunham-Bush.
3. IEC (International Environmental Corporation); LSB Industries.
4. INDEECO.
5. Markel Products; TPI Corporation.
6. Marley Engineered Products.
7. QMark; Marley Engineered Products.
8. Rosemex Products.
9. Trane.
10. Or approved equal.

2.2 DESCRIPTION

A. Factory-assembled and -tested unit complying with AHRI 440.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 2021.

2.3 PERFORMANCE REQUIREMENTS

A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.4 COIL SECTION INSULATION

A. Insulation Materials: ASTM C 1071; surfaces exposed to airstream must have aluminum-foil facing to prevent erosion of glass fibers.

1. Thickness: 1 inch .
2. Thermal Conductivity (k-Value): 0.26 Btu x in./h x sq. ft. at 75 deg F mean temperature.
3. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
4. Adhesive: Comply with ASTM C 916 and with NFPA 90A or NFPA 90B.
5. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.

B. Insulation Materials: Comply with NFPA 90A or NFPA 90B. Unicellular polyethylene thermal plastic, preformed sheet insulation complying with ASTM C 534, Type II, except for density.

1. Thickness: 1/2 inch .
2. Thermal Conductivity (k-Value): 0.24 Btu x in./h x sq. ft. at 75 deg F mean temperature.
3. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM C 411.
4. Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
5. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.

2.5 CABINETS

A. Material: Steel with factory prime coating, ready for field painting .

1. Vertical Unit, Exposed Front Panels: Minimum 0.0528-inch- thick sheet steel, removable panels with channel-formed edges secured with tamperproof cam fasteners.
2. Horizontal Unit, Exposed Bottom Panels: Minimum 0.0528-inch- thick sheet steel, removable panels secured with tamperproof cam fasteners and safety chain.
3. Recessed Flanges: Steel, finished to match cabinet.
4. Control Access Door: Key operated.
5. Base: Minimum 0.0528-inch- thick steel, finished to match cabinet, 4 inches high with leveling bolts.
6. Extended Piping Compartment: 8-inch- wide piping end pocket.
7. False Back: Minimum 0.0428-inch- thick steel, finished to match cabinet.

2.6 FILTERS

A. Minimum Efficiency Reporting Value and Average Arrestance: According to ASHRAE 52.2.

B. Minimum Efficiency Reporting Value: According to ASHRAE 52.2.

C. Material: Washable Foam, MERV 3 .

D. Material: Glass fiber treated with adhesive, .

E. Material: Pleated cotton-polyester media, .

2.7 COILS

A. Hot-Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain.

2.8 CONTROLS

A. Fan and Motor Board: Removable.

1. Fan: Forward curved, double width, centrifugal, directly connected to motor; thermoplastic or painted-steel wheels and aluminum, painted-steel, or galvanized-steel fan scrolls.
2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
3. Wiring Terminations: Connect motor to chassis wiring with plug connection.

B. Factory, Hot-Water Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.

1. Two -way, modulating control valve.
2. Hose Kits: Minimum 400-psig working pressure, and operating temperatures from 33 to 211 deg F. Tag hose kits to equipment designations.

    a. Length: 24 inches .
    b. Minimum Diameter: Equal to cabinet unit-heater connection size.

3. Two-Piece, Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 600-psig minimum CWP rating and blowout-proof stem.
4. Calibrated-Orifice Balancing Valves: Bronze body, ball type, 125-psig working pressure, 250 deg F maximum operating temperature; with calibrated orifice or venture, connection for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.
5. Automatic Flow-Control Valve: Brass or ferrous-metal body, 300-psig working pressure at 250 deg F, with removable, corrosion-resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow within plus or minus 10 percent of differential pressure range of 2 to 80 psig.
6. Y-Pattern, Hot-Water Strainers: Cast-iron body (ASTM A 126, Class B); 125-psig minimum working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum NPS 1/2 threaded pipe and full-port ball valve in strainer drain connection.
7. Wrought-Copper Unions: ASME B16.22.

C. Control devices and operational sequences are specified in Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control."

D. Basic Unit Controls:

1. Control voltage transformer.
2. Unit-mounted thermostat with the following features:

    a. Heat-off switch.
    b. Fan on-auto switch.
    c. Manual fan-speed switch.
    d. Adjustable deadband.
    e. Concealed set point.
    f. Concealed indication.
    g. Deg F indication.

3. Unit-mounted temperature sensor.
4. Unoccupied period override push button.
5. Data entry and access port.

    a. Input data includes room temperature and occupied and unoccupied periods.
    b. Output data includes room temperature, supply-air temperature, entering-water temperature, operating mode, and status.

E. Direct Digital Control Terminal Controller:

1. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
2. Unoccupied Period Override: Two hours.
3. Unit Supply-Air Fan Operations:

    a. Occupied Periods: Fan runs continuously.
    b. Unoccupied Periods: Fan cycles to maintain setback room temperature.

4. Heating-Coil Operations:

    a. Occupied Periods: Open control valve Modulate control valve Energize electric-resistance coil to provide heating if room temperature falls below thermostat set point.
    b. Unoccupied Periods: Start fan and open control valve modulate control valve energize electric-resistance coil if room temperature falls below setback temperature.

5. Outdoor-Air Damper Operation:

    a. Occupied Periods: Open dampers. Delay damper opening if room temperature is more than three degrees below set point.
    b. Unoccupied Periods: Close damper.

6. Controller must have volatile-memory backup.

F. Interface with Direct Digital Control System for HVAC Requirements:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at central workstation.
3. Interface must be BAC-net compatible for central Direct Digital Control system for HVAC workstation and include the following functions:

a. Adjust set points.
b. Cabinet unit-heater start, stop, and operating status.
c. Data inquiry, including supply-air and room-air temperature.
d. Occupied and unoccupied schedules.

G. Electrical Connection: Factory-wired motors and controls for a single field connection.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive cabinet unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping and electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install wall boxes in finished wall assembly; seal and weatherproof. Joint-sealant materials and applications are specified in Section 079200 "Joint Sealants."

B. Install cabinet unit heaters to comply with NFPA 90A.

C. Suspend cabinet unit heaters from structure with elastomeric hangers. Vibration isolators are specified in Section 230548.13 "Vibration Controls for HVAC."

D. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

E. Install new filters in each fan-coil unit within two weeks of Substantial Completion.

3.4 CONNECTIONS

A. Piping installation requirements are specified in Section 232113 "Hydronic Piping," and Section 232116 "Hydronic Piping Specialties." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Connect piping to cabinet unit heater's factory, hot-water piping package. Install the piping package if shipped loose.

D. Connect supply and return ducts to cabinet unit heaters with flexible duct connectors specified in Section 233300 "Air Duct Accessories."

E. Comply with safety requirements in UL 1995.

F. Unless otherwise indicated, install union and gate or ball valve on supply-water connection and union and calibrated balancing valve on return-water connection of cabinet unit heater. Hydronic specialties are specified in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties."

G. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

H. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Units will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust initial temperature set points.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate cabinet unit heaters.

END OF SECTION 238239.13

SECTION 238239.19 - WALL AND CEILING UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes wall and ceiling heaters with propeller fans and electric-resistance heating coils.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Sustainable Design Submittals:

C. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include details of anchorages and attachments to structure and to supported equipment.
4. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
5. Wiring Diagrams: Power, signal, and control wiring.

D. Samples: For each exposed product and for each color and texture specified.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wall and ceiling unit heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Berko; Marley Engineered Products.
2. Chromalox, Inc.
3. INDEECO.
4. Marley Engineered Products.
5. QMark; Marley Engineered Products.
6. Trane.
7. Or approved equal.

2.2 DESCRIPTION

A. Assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 CABINET

A. Front Panel: Stamped-steel louver , with removable panels fastened with tamperproof fasteners.

B. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Commissioner, applied to factory-assembled and -tested wall and ceiling heaters before shipping.

C. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.

D. Surface-Mounted Cabinet Enclosure: Steel with finish to match cabinet.

2.4 COIL

A. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high-temperature protection. Provide integral circuit breaker for overcurrent protection.

2.5 FAN AND MOTOR

A. Fan: Aluminum propeller directly connected to motor.

B. Motor: Permanently lubricated, multispeed. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

2.6 CONTROLS

A. Controls: Unit-mounted thermostat. Low-voltage relay with transformer kit.

B. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive wall and ceiling unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install wall and ceiling unit heaters to comply with NFPA 90A.

B. Install wall and ceiling unit heaters level and plumb.

C. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 238239.19

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Supplemental requirements applicable to Work specified in Division 26. This Section is also referenced by related Work specified in other Divisions.

B. Related Requirements:

1. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. 8P8C: An 8-position 8-contact modular jack.
2. A: Ampere, unit of electrical current.
3. AC or ac: Alternating current.
4. AFCI: Arc-fault circuit interrupter.
5. AIC: Ampere interrupting capacity.
6. AL, Al, or ALUM: Aluminum.
7. ASD: Adjustable-speed drive.
8. ATS: Automatic transfer switch.
9. AWG: American wire gauge; see ASTM B258.
10. BAS: Building automation system.
11. BIL: Basic impulse insulation level.
12. BIM: Building information modeling.
13. CAD: Computer-aided design or drafting.
14. CATV: Community antenna television.
15. CB: Circuit breaker.
16. cd: Candela, the SI fundamental unit of luminous intensity.
17. CO/ALR: Copper-aluminum, revised.
18. COPS: Critical operations power system.
19. CU or Cu: Copper.
20. CU-AL or AL-CU: Copper-aluminum.

21. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
22. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
23. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
24. dBm: Decibel absolute power with respect to 1 mW.
25. DC or dc: Direct current.
26. DCOA: Designated critical operations area.
27. DDC: Direct digital control (HVAC).
28. EGC: Equipment grounding conductor.
29. ELV: Extra-low voltage.
30. EMF: Electromotive force.
31. EMI: Electromagnetic interference.
32. EPM: Electrical preventive maintenance.
33. EPS: Emergency power supply.
34. EPSS: Emergency power supply system.
35. ESS: Energy storage system.
36. EV: Electric vehicle.
37. EVPE: Electric vehicle power export equipment.
38. EVSE: Electric vehicle supply equipment.
39. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion 1 fc = 10 lx in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.
40. FLC: Full-load current.
41. ft: Foot.
42. ft-cd: Foot-candle, the antiquated U.S. Standard unit of illuminance, equal to one international candle measured at a distance of one foot, that was superseded in 1948 by the unit "footcandle" after the SI unit candela (cd) replaced the international candle; see "fc,"
43. GEC: Grounding electrode conductor.
44. GFCI: Ground-fault circuit interrupter.
45. GFPE: Ground-fault protection of equipment.
46. GND: Ground.
47. HACR: Heating, air conditioning, and refrigeration.
48. HDPE: High-density polyethylene.
49. HID: High-intensity discharge.
50. HP or hp: Horsepower.
51. HVAC: Heating, ventilating, and air conditioning.
52. Hz: Hertz.
53. IBT: Intersystem bonding termination.
54. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
55. IP: Ingress protection rating (enclosures); Internet protocol (communications).
56. IR: Infrared.
57. IS: Intrinsically safe.
58. IT&R: Inspecting, testing, and repair.
59. ITE: Information technology equipment.
60. kAIC: Kiloampere interrupting capacity.
61. kcmil or MCM: One thousand circular mils.
62. kV: Kilovolt.

63. kVA: Kilovolt-ampere.
64. kVAr or kVAR: Kilovolt-ampere reactive.
65. kW: Kilowatt.
66. kWh: Kilowatt-hour.
67. LAN: Local area network.
68. lb: Pound (weight).
69. lbf: Pound (force).
70. LCD: Liquid-crystal display.
71. LCDI: Leakage-current detector-interrupter.
72. LED: Light-emitting diode.
73. Li-ion: Lithium-ion.
74. lm: Lumen, the SI derived unit of luminous flux.
75. LNG: Liquefied natural gas.
76. LP-Gas: Liquefied petroleum gas.
77. LRC: Locked-rotor current
78. LV: Low voltage.
79. lx: Lux, the SI derived unit of illuminance equal to one lumen per square meter.
80. m: Meter.
81. MCC: Motor-control center.
82. MDC: Modular data center.
83. MG set: Motor-generator set.
84. MIDI: Musical instrument digital interface.
85. MLO: Main lugs only.
86. MV: Medium voltage.
87. MVA: Megavolt-ampere.
88. mW: Milliwatt.
89. MW: Megawatt.
90. MWh: Megawatt-hour.
91. NC: Normally closed.
92. Ni-Cd: Nickel cadmium.
93. Ni-MH: Nickel-metal hydride.
94. NIU: Network interface unit.
95. NO: Normally open.
96. NPT: National (American) standard pipe taper.
97. OCPD: Overcurrent protective device.
98. ONT: Optical network terminal.
99. PC: Personal computer.
100. PCS: Power conversion system.
101. PCU: Power-conditioning unit.
102. PF or pf: Power factor.
103. PHEV: Plug-in hybrid electric vehicle.
104. PLC: Programmable logic controller.
105. PLFA: Power-limited fire alarm.
106. PoE: Power over Ethernet.
107. PV: Photovoltaic.
108. PVC: Polyvinyl chloride.
109. pW: Picowatt.
110. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.
111. RMS or rms: Root-mean-square.

112. RPM or rpm: Revolutions per minute.
113. SCADA: Supervisory control and data acquisition.
114. SCR: Silicon-controlled rectifier.
115. SPD: Surge protective device.
116. sq.: Square.
117. SWD: Switching duty.
118. TCP/IP: Transmission control protocol/Internet protocol.
119. TEFC: Totally enclosed fan-cooled.
120. TR: Tamper resistant.
121. TVSS: Transient voltage surge suppressor.
122. UL: (standards) Underwriters Laboratories, Inc.; (product categories) UL, LLC.
123. UL CCN: UL Category Control Number.
124. UPS: Uninterruptible power supply.
125. USB: Universal serial bus.
126. UV: Ultraviolet.
127. V: Volt, unit of electromotive force.
128. V(ac): Volt, alternating current.
129. V(dc): Volt, direct current.
130. VA: Volt-ampere, unit of complex electrical power.
131. VAR: Volt-ampere reactive, unit of reactive electrical power.
132. VFC: Variable-frequency controller.
133. VOM: Volt-ohm-multimeter.
134. VPN: Virtual private network.
135. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
136. W: Watt, unit of real electrical power.
137. Wh: Watt-hour, unit of electrical energy usage.
138. WPT: Wireless power transfer.
139. WPTE: Wireless power transfer equipment.
140. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit (thin wall).
7. EPEC-A: Type A electrical HDPE underground conduit.
8. EPEC-B: Type B electrical HDPE underground conduit.
9. ERMC: Electrical rigid metal conduit.
10. ERMC-A: Aluminum electrical rigid metal conduit.
11. ERMC-S: Steel electrical rigid metal conduit.
12. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
13. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
14. ERMC-SS: Stainless steel electrical rigid metal conduit.
15. FMC: Flexible metal conduit.
16. FMC-A: Aluminum flexible metal conduit.

17. FMC-S: Steel flexible metal conduit.
18. FMT: Steel flexible metallic tubing.
19. FNMC: Flexible nonmetallic conduit. See LFNC.
20. HDPE: HDPE underground conduit (thick wall).
21. HDPE-40: Schedule 40 HDPE underground conduit.
22. HDPE-80: Schedule 80 HDPE underground conduit.
23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
32. PVC: Rigid PVC conduit.
33. PVC-40: Schedule 40 rigid PVC conduit.
34. PVC-80: Schedule 80 rigid PVC Conduit.
35. PVC-A: Type A rigid PVC concrete-encased conduit.
36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
37. RGS: See ERMC-S-G.
38. RMC: See ERMC.
39. RTRC: Reinforced thermosetting resin conduit.
40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Cable Types:

1. AC: Armored cable.
2. CATV: Coaxial general-purpose cable.
3. CATVP: Coaxial plenum cable.
4. CATVR: Coaxial riser cable.
5. CI: Circuit integrity cable.
6. CL2: Class 2 cable.
7. CL2P: Class 2 plenum cable.
8. CL2R: Class 2 riser cable.
9. CL2X: Class 2 cable, limited use.
10. CL3: Class 3 cable.
11. CL3P: Class 3 plenum cable.
12. CL3R: Class 3 riser cable.
13. CL3X: Class 3 cable, limited use.
14. CM: Communications general-purpose cable.
15. CMG: Communications general-purpose cable.
16. CMP: Communications plenum cable.
17. CMR: Communications riser cable.
18. CMUC: Under-carpet communications wire and cable.

19. CMX: Communications cable, limited use.
20. DG: Distributed generation cable.
21. FC: Flat cable.
22. FCC: Flat conductor cable.
23. FPL: Power-limited fire-alarm cable.
24. FPLP: Power-limited fire-alarm plenum cable.
25. FPLR: Power-limited fire-alarm riser cable.
26. IGS: Integrated gas spacer cable.
27. ITC: Instrumentation tray cable.
28. ITC-ER: Instrumentation tray cable, exposed run.
29. MC: Metal-clad cable.
30. MC-HL: Metal-clad cable, hazardous location.
31. MI: Mineral-insulated, metal-sheathed cable.
32. MTW: (machine tool wiring) Moisture-, heat-, and oil-resistant thermoplastic cable.
33. MV: Medium-voltage cable.
34. NM: Nonmetallic sheathed cable.
35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
37. NPLF: Non-power-limited fire-alarm circuit cable.
38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
40. NUCC: Nonmetallic underground conduit with conductors.
41. OFC: Conductive optical fiber general-purpose cable.
42. OFCG: Conductive optical fiber general-purpose cable.
43. OFCP: Conductive optical fiber plenum cable.
44. OFCR: Conductive optical fiber riser cable.
45. OFN: Nonconductive optical fiber general-purpose cable.
46. OFNG: Nonconductive optical fiber general-purpose cable.
47. OFNP: Nonconductive optical fiber plenum cable.
48. OFNR: Nonconductive optical fiber riser cable.
49. P: Marine shipboard cable.
50. PLTC: Power-limited tray cable.
51. PLTC-ER: Power-limited tray cable, exposed run.
52. PV: Photovoltaic cable.
53. RHH: (high heat) Thermoset rubber, heat-resistant cable.
54. RHW: Thermoset rubber, moisture-resistant cable.
55. SA: Silicone rubber cable.
56. SE: Service-entrance cable.
57. SER: Service-entrance cable, round.
58. SEU: Service-entrance cable, flat.
59. SIS: Thermoset cable for switchboard and switchgear wiring.
60. TBS: Thermoplastic cable with outer braid.
61. TC: Tray cable.
62. TC-ER: Tray cable, exposed run.
63. TC-ER-HL: Tray cable, exposed run, hazardous location.
64. THW: Thermoplastic, heat- and moisture-resistant cable.
65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
66. THHW: Thermoplastic, heat- and moisture-resistant cable.

67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
68. TW: Thermoplastic, moisture-resistant cable.
69. UF: Underground feeder and branch-circuit cable.
70. USE: Underground service-entrance cable.
71. XHH: Cross-linked polyethylene, heat-resistant cable.
72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

D. Abbreviations and Acronyms for Electrical Flexible Cord Types:

1. SEO: 600 V extra-hard-usage, hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
2. SEOW: 600 V extra-hard-usage, hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp or wet locations.
3. SEOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
4. SEOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp or wet locations.
5. SJEO: 300 V hard-usage, junior hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.
6. SJEOW: 300 V hard-usage, junior hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp or wet locations.
7. SJEOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.
8. SJEOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp or wet locations.
9. SJO: 300 V hard-usage, junior hard-service cord with thermoset insulation and oil-resistant thermoset outer cover for damp locations.
10. SJOW: 300 V hard-usage, junior hard-service cord with thermoset insulation and oil-resistant thermoset outer cover for damp or wet locations.
11. SJOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer cover for damp locations.
12. SJOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer cover for damp or wet locations.
13. SJTO: 300 V hard-usage, junior hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.
14. SJTOW: 300 V hard-usage, junior hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer cover for damp or wet locations.
15. SJTOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.
16. SJTOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer cover for damp or wet locations.
17. SO: 600 V extra-hard-usage, hard-service cord with thermoset insulation and oil-resistant thermoset outer covering for damp locations.
18. SOW: 600 V extra-hard-usage, hard-service cord with thermoset insulation and oil-resistant thermoset outer covering for damp or wet locations.
19. SOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer covering for damp locations.
20. SOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer covering for damp or wet locations.

21. STO: 600 V extra-hard-usage, hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.
22. STOW: 600 V extra-hard-usage, hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer covering for damp or wet locations.
23. STOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.
24. STOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer covering for damp or wet locations.

E. Definitions:

1. 8-Position 8-Contact (8P8C) Modular Jack: An unkeyed jack with up to eight contacts commonly used to terminate twisted-pair and multiconductor Ethernet cable. Also called a "TIA-1096 miniature 8-position series jack" (8PSJ), or an "IEC 8877 8-pole jack."

    a. Be careful when suppliers use "RJ45" generically. Obsolete RJ45 jacks used for analog telephone cables have rejection keys. 8P8C jacks used for digital telephone cables and Ethernet cables do not have rejection keys.

2. Basic Impulse Insulation Level (BIL): Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
3. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
4. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
5. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
6. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) (National Electrical Safety Code) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.
7. Designated Seismic System: A system component that requires design in accordance with Ch. 13 of ASCE/SEI 7 and for which the Component Importance Factor is greater than 1.0.
8. Direct Buried: Installed underground without encasement in concrete or other protective material.
9. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

    a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
    b. Concrete Box: A box intended for use in poured concrete.
    c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
    d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.

e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
f. Device Box: A box with provisions for mounting a wiring device directly to the box.
g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
o. Raised-Floor Box: A floor box intended for use in raised floors.
p. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
q. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
r. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
s. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
t. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

10. Emergency Systems: Those systems legally required and classed as emergency by City Of New York that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
11. Fault Limited: Providing or being served by a source of electrical power that is limited to not more than 100 W when tested in accordance with UL 62368-1.

    a. The term "fault limited" is intended to encompass most Class 1, 2, and 3 power-limited sources complying with Article 725 of NFPA 70 and NYCEC; Class ES1 and ES2 electrical energy sources that are Class PS1 electrical power sources (e.g., USB); and Class ES3 electrical energy sources that are Class PS1 and PS2 electrical power sources (e.g., PoE). See UL 62368-1 for discussion of classes of electrical energy sources and classes of electrical power sources.

12. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
13. Jacket: A continuous nonmetallic outer covering for conductors or cables.
14. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
15. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
16. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
17. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
18. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
19. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
20. Sheath: A continuous metallic covering for conductors or cables.
21. UL Category Control Number (CCN): An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
22. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

    a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
    b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
    c. Extra-Low Voltage (ELV): Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
    d. Low Voltage (LV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.
    e. Medium Voltage (MV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated about 1 kV but not exceeding 69 kV.
    f. High Voltage: (1) (circuits) Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 69 kV but not exceeding 230 kV. (2) (safety) Having sufficient electromotive force to inflict bodily harm or injury.

23. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an "insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.

1.4 SEQUENCING

A. Conduct and submit results of power system studies before submitting Product Data and Shop Drawings for electrical equipment.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Coordination Drawings for Structural Supports: Show coordination of structural supports for equipment and devices, including restraints and bracing for control of seismic and wind loads, with other systems, equipment, and structural supports in the vicinity.

B. Coordination Drawings for Conduit Routing: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

C. Coordination Drawings for Large Equipment Indoor Installations:

1. Location plan, drawn to scale, showing heavy equipment or truck access paths to loading dock or other freight access into building. Indicate available width and height of doors or openings.
2. Floor plan for entry floor and floor where equipment is located, drawn to scale, showing heavy equipment access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Dimensioned concrete bases, outlines of equipment, conduit entries, and grounding equipment locations.
    b. If freight elevator must be used, indicate width and height of door and depth of car. Indicate if large equipment must be tipped to use elevator.
    c. Dimensioned working clearances and dedicated areas below and around electrical equipment where obstructions and tripping hazards are prohibited.

3. Reflected ceiling plans for entry floor and floor where equipment is located, drawn to scale, on which the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways, busways,.
    b. Location of lighting fixtures, sprinkler piping and sprinklers, ducts and diffusers, and other obstructions, indicating available overhead clearance.
    c. Dimensioned working clearances and dedicated areas above and around electrical equipment where foreign systems and equipment are prohibited.

D. Coordination Drawings for Large Equipment Outdoor Installations:

1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
b. Indicate clear dimensions for fence gates and wall openings.
c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
d. Indicate clear height below tree branches, overhead lines, bridges, and other overhead obstructions in access path, or where cranes and hoists will be needed to handle large electrical equipment.
e. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways.
f. Dimensioned working clearances and dedicated areas around electrical equipment.

1.7 INFORMATIONAL SUBMITTALS

A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Commissioner including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.
2. Submission of specified coordination drawings.
3. Submission of action submittals specified in Division 26.
4. Orders placed for major electrical equipment.
5. Arrival of major electrical equipment on-site.
6. Preinstallation meetings specified in Division 26.
7. Utility service outages.
8. Utility service inspection and activation.
9. Mockup reviews.
10. Closing of walls and ceilings containing electrical Work.
11. System startup, testing, and commissioning activities for major electrical equipment.
12. System startup, testing, and commissioning activities for emergency lighting.
13. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
14. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
15. Requests for special inspections.

B. Engineering Services Drawings for Structural Masonry Wall Penetrations: Where indicated on Drawings, provide reflected ceiling plan(s), supplemented by elevations, sections, and other details, drawn to scale, signed and sealed by a qualified New York State licensed structural professional engineer, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Location and dimensions of structural members supporting wall.
2. Location and dimensions of columns near penetrations.
3. Location and dimension of headers and lintels.
4. Doors and windows near penetrations.
5. Location and dimensions of penetrating cuts.
6. Sprinkler piping and sleeves.
7. Plumbing piping and sleeves.

8. Ductwork and sleeves.
9. Cable tray and sleeves.
10. Conduit and sleeves.
11. Firestopping assemblies for rated penetrations.
12. Structural supports for piping, ductwork, and conduit on both sides of wall.

C. Welding certificates.

D. Seismic-Load Performance Certificates: Provide special certification for designated seismic systems as indicated in ASCE/SEI 7-05, Paragraph 13.2.2, "Special Certification Requirements for Designated Seismic Systems" for all Designated Seismic Systems identified on Drawings or in the Specifications.

1. Include the following information:

   a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
   d. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
   e. Provide equipment manufacturer's written certification for each designated active electrical seismic device and system, stating that it will remain operable following the design earthquake. Certification must be based on requirements of ASCE/SEI 7, including shake table testing per ICC-ES AC156 or a similar nationally recognized testing standard procedure ASCE/SEI 7-05.
   f. Provide equipment manufacturer's written certification that components with hazardous contents maintain containment following the design earthquake by methods required in ASCE/SEI 7-05.
   g. Submit evidence demonstrating compliance with these requirements for approval to NYC DOB after review and acceptance by qualified structural professional engineer licensed in the State of New York.

2. The following systems and components are Designated Seismic Systems and require written special certification of seismic qualification by manufacturer:

   a. Hangers and supports specified in Section 260529 "Hangers and Supports for Electrical Systems."
   b. Conduits and their mounting provisions specified in Section 260533.13 "Conduits for Electrical Systems."
   c. Boxes and their mounting provisions specified in Section 260533.16 "Boxes and Covers for Electrical Systems."
   d. Cable trays, accessories, and components specified in Section 260536 "Cable Trays for Electrical Systems."
   e. Equipment, accessories, and components specified in Section 262413 "Switchboards."
   f. Equipment, accessories, and components specified in Section 262416 "Panelboards."
   g. Equipment, accessories, and components specified in Section 262913.03 "Manual and Magnetic Motor Controllers."

h. Equipment, accessories, and components specified in Section 263323.11 "Central Battery Equipment for Emergency Lighting."
i. Equipment, accessories, and components specified in Section 263600 "Transfer Switches."
j. Luminaires, accessories, and components specified in Section 265119 "LED Interior Lighting."
k. Luminaires, accessories, and components specified in Section 265213 "Emergency and Exit Lighting."
l. Luminaires, accessories, and components specified in Section 265619 "LED Exterior Lighting."

1.8 CLOSEOUT SUBMITTALS

A. Refer to DDC General Conditions, provide the following items:

1. Facility EPM Program Binders:

a. Complete Set: On approved online or cloud solution and USB media that is clearly and permanently labeled with attached placard on lanyard to prevent misplacement.
b. Volumes 2 and 8: Reproducible hardcopy on archival quality, 28 lb, acid-free, bond paper.

2. Software and Firmware Operational Documentation: Provide software and firmware operational documentation in Facility EPM Program Binders, including the following:

a. Software operating and upgrade manuals.
b. Names, versions, and website addresses for locations of installed software.
c. Device address list.
d. Printout of software application and graphic screens.
e. Testing and adjusting of panic and emergency power features.
f. For lighting controls include the following:

1) Adjustments of scene preset controls, adjustable fade rates, and fade overrides.
2) Operation of adjustable zone controls.

3. Software:

a. Program Software Backup: Provide username and password for approved online or cloud solution and USB media that is clearly and permanently labeled with attached placard on lanyard to prevent misplacement.
b. Provide to the Commissioner upgrades and unrestricted licenses for installed and backup software, including operating systems and programming tools required for operation.

1.9 QUALIFICATIONS

A. Welder: Installer possessing active qualifications specified in DDC General Conditions with instruction and certification in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M.

B. Lighting Testing and Inspecting Agency: Entity possessing active qualifications specified in DDC General Conditions with documented instruction and experience with testing and inspecting lighting installations in accordance with IES LM-5.

1.10 FIELD CONDITIONS

A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 26 must comply with requirements specified in Section 260011 "Facility Performance Requirements for Electrical."

PART 2 - PRODUCTS

2.1 FACILITY ELECTRICAL PREVENTIVE MAINTENANCE (EPM) PROGRAM BINDERS

A. Description: Set of binders containing operation and maintenance data for facility's electrical equipment that was compiled during analysis of installed electrical Work for Facility EPM Program development.

B. Applicable Standards:

1. Regulatory Requirements: Comply with recommendations in NFPA 70B and NYCEC.
2. General Characteristics:

a. Volume 1 - Introduction:

1) Summarize how Facility EPM Program Analysis was performed, how data were collected, and how volumes are organized.
2) Describe Facility EPM Program and provide recommended policies and procedures for implementing the program and keeping it current.
3) Provide place for Commissioner to identify contact information for employees responsible for implementing and maintaining Facility EPM Program.

b. Volume 2 - Facility Safety, Hazards Awareness, and Emergency Procedures:

1) Include training requirements for employees and contractors.
2) Include list of known facility hazards impacting IT&R activities.
3) Include approval and permitting procedures for IT&R activities.
4) Include incident emergency response procedures.
5) Include emergency shutdown procedures.
6) Include electrical disaster recovery procedures.

c. Volume 3 - Operating Procedures for Electrical Equipment and Controls:

1) Inverter system for emergency light power source.
2) Roll up generator connection.
3) Dimming system for lighting control.

d. Volume 4 - Facility Diagrams and Schedules:

1) Include single-line diagrams.
2) Include grounding and bonding diagrams.
3) Include essential wiring diagrams.

4) Include system automation diagrams (SCADA, BMS, lighting, HVAC, etc.).
5) Include records of switchgear, switchboard, and panelboard schedules.
6) Include time-current curves for overcurrent protective devices.
7) Include list of load-current and overload-relay heaters with related motor nameplate data.

e. Volume 5 - Inventory of Facility Equipment Using Electrical Power:

1) Include simplified floor plans showing equipment locations.
2) Identify critical equipment (electrical or otherwise).
3) Include identifying designations and nameplate data.
4) Include warranty and maintenance contract information.

f. Volume 6 - Inventory of Facility Tools, Supplies, and Personnel Protective Equipment:

1) Include schedules of maintenance material items recommended to be stored at facility.
2) Include list of lamp types and photoelectric relays used in facility with ANSI and manufacturers' codes.
3) Include calibration and servicing data for each item.

g. Volume 7 - Inspection, Testing, and Repair (IT&R) Plan:

1) Include tables showing frequency of activities for each item.
2) Include annual schedule with activities mapped to specific days of the year.

h. Volume 8 - Spare Parts List:

1) Include list of all parts required to perform IT&R procedures.
2) Identify quantities of which parts are recommended to be stored on-site.
3) Include source contact information and budget cost for each item.

i. Volume 9 - Construction Project Closeout Record Documentation:

1) Include records of power system studies and photometric studies.
2) Include records of risk assessment studies.
3) Include records of electrical system startup and commissioning activities.
4) Include records of baseline inspections and tests.
5) Include records of baseline infrared photographs with normal light photographs showing the location, direction, angle, and conditions necessary for reproducing each infrared photograph.
6) Include records of baseline settings for adjustable equipment and devices.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DEVELOPMENT OF FACILITY EPM PROGRAM

A. Facility EPM Program must be developed by qualified EPM specialist.

B. Conduct Facility EPM Program analysis in accordance with NFPA 70B and NYCEC recommendations.

C. Compile operation and maintenance data from Facility EPM Program analysis and submit Facility EPM Program Binders.

3.3 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70, NYCEC and NECA NEIS 1 for installation of Work specified in Division 26. Consult Commissioner for resolution of conflicting requirements.

3.4 FIELD QUALITY CONTROL

A. Administrant for Low-Voltage Electrical Tests and Inspections:

1. Engage qualified low-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
3. Administer and perform tests and inspections with assistance of factory-authorized service representative.

B. Administrant for Structural Tests and Inspections:

1. The City Of New York performs all Special Inspections (controlled inspections) under a separate contract.

C. Administrant for Field Tests and Inspections of Lighting Installations:

1. Engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
3. Administer and perform tests and inspections with assistance of factory-authorized service representative.

3.5 CLOSEOUT ACTIVITIES

A. Demonstration:

1. With assistance from factory-authorized service representatives, demonstrate to City of New York's personnel how to operate the following systems and equipment:

a. Lighting control devices specified in Section 260923 "Lighting Control Devices."
b. Electronic metering and billing software specified in Section 262713 "Electricity Metering."

2. Provide video recordings of demonstrations to the Commissioner.

B. Instruction:With assistance from factory-authorized service representatives, instruct City of New York's personnel on the following topics:

1. How to implement Facility EPM Program.
2. How to operate normal and emergency electrical systems, including justifications for, and limitations of, protective device settings recommended in study report specified in Section 260573.16 "Coordination Studies."
3. Electrical power safety fundamentals refresher including arc-flash hazard safety features of electrical power distribution equipment in facility, interpreting arc-flash warning labels, selecting appropriate personal protective equipment, and understanding significance of findings documented in study report specified in Section 260573.19 "Arc-Flash Hazard Analysis."
4. How to adjust and operate systems specified in Section 260913 "Electrical Power Monitoring."
5. How to adjust and operate devices specified in Section 260923 "Lighting Control Devices."
6. How to adjust and operate hardware and software specified in. Laptop computer must be used in instruction.
7. How to adjust and operate witchboards, overcurrent protective devices, instrumentation, and accessories, and to use and reprogram microprocessor-based trip, monitoring, and communication units specified in Section 262413 "Switchboards."
8. How to adjust and operate hardware and software specified in Section 262713 "Electricity Metering."
9. How to adjust and operate equipment specified in.
10. How to adjust and operate controllers, remote alarm panels , and to use and reprogram microprocessor-based controls within this equipment specified in Section 262933 "Controllers for Fire Pump Drivers."
11. How to adjust and operate equipment specified in Section 263323.11 "Central Battery Equipment for Emergency Lighting."
12. How to adjust and operate equipment specified in.
13. How to adjust and operate transfer switches and related equipment, including ground-fault protection system, specified in Section 263600 "Transfer Switches."
14. How to adjust and operate devices specified in Section 264313 "Surge Protective Devices for Low-Voltage Electrical Power Circuits."
15. How to adjust and operate luminaires and photoelectric controls specified in Section 265619 "LED Exterior Lighting."
16. Provide video recordings of demonstration sessions to the Commissioner.

END OF SECTION 260010

SECTION 260011 - FACILITY PERFORMANCE REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Field conditions and other facility performance requirements applicable to Work specified in Division 26.

1.3 FIELD CONDITIONS

A. Seismic Hazard Design Loads:

1. Unless otherwise indicated on Contract Documents, specified Work must withstand seismic hazard design loads determined in accordance with requirements specified in this Section, adjusted for installed elevation above or below grade.

a. The term "withstand" means "unit must remain in place without separation of parts from unit when subjected to specified seismic hazard design loads and unit must be fully operational after seismic event."

2. Calculation Factors, ASCE/SEI 7-16, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-16 unless otherwise indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 260011

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUIMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Copper building wire.
2. Metal-clad cable, Type MC.
3. Mineral-insulated cable, Type MI.
4. Fire-alarm wire and cable.
5. Connectors and splices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for , wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Copper building wire.
2. Metal-clad cable, Type MC.
3. Mineral-insulated cable, Type MI.
4. Fire-alarm wire and cable.
5. Connectors and splices.

B. Sustainable Design Submittals:

1. Product Data: For each conductor and cable indicating lead content.

2. Product Data: For solvents and adhesives, indicating VOC content.

C. Product Schedule: Indicate type, use, location, and termination locations.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpha Wire; brand of Belden, Inc.
2. Belden Inc.
3. Encore Wire Corporation.
4. General Cable; Prysmian Group North America.
5. Southwire Company, LLC.
6. Or approved equal.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductor Insulation:

1. Type RHH Type RHW-2. Comply with UL 44.
2. Type THHN Type THWN-2. Comply with UL 83.
3. Type THW. Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
4. Type XHHW-2. Comply with UL 44.

E. Shield:

1. Type TC-ER: Cable designed for use with ASDs, with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire dual spirally wrapped copper tape shields and three bare symmetrically applied ground wires, and sunlight- and oil-resistant outer PVC jacket.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems; Atkore International.
2. Southwire Company, LLC.
3. Belden.
4. Or approved equal.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit and multicircuit with color-coded conductors.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2. Comply with UL 83.
2. Type XHHW-2. Comply with UL 44.

H. Armor: Steel, interlocked.

I. Jacket: PVC applied over armor.

2.3 MINERAL-INSULATED CABLE, TYPE MI

A. Description: Solid copper conductors encased in compressed metal oxide with an outer metallic sheath, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. PYROTENAX; brand of nVent Electrical plc.
2. TEC Wiring.
3. ARi Industries.
4. Or approved equal.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. UL 2196 for fire resistance.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper.

E. Insulation: Compressed magnesium oxide.

F. Sheath: Copper.

2.4 FIRE-ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Wire & Cable Inc.
2. CommScope, Inc.
3. Comtran Corporation.
4. Genesis Cable Products; Honeywell International, Inc.
5. PYROTENAX; brand of nVent Electrical plc.
6. Prysmian Cables and Systems; Prysmian Group North America.
7. Radix Wire.
8. Rockbestos-Suprenant Cable Corp.
9. Superior Essex Inc.; subsidiary of LS Corp.
10. West Penn Wire; brand of Belden, Inc.
11. Or approved equal.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

1. Lead Content: Less than 300 parts per million.

C. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire-alarm and cable tray installation, plenum rated.

2.5 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. AFC Cable Systems; Atkore International.
3. ILSCO.
4. Ideal Industries, Inc.
5. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
6. Service Wire Co.
7. Or approved equal.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: Two hole with long barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:

1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

C. ASD Output Circuits Cable: Extra-flexible stranded for all sizes.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.3 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal clad cable, Type MC.

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

G. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless steel, wire-mesh, strain relief device at terminations to suit application.

H. ASD Output Circuits: Type TC-ER cable with braided shield.

3.4 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points in accordance with Section 260533.13 "Conduits for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.5 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

A. Comply with NFPA 72.

B. Install plenum cable in environmental airspaces, including plenum ceilings.
   1. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.
      a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.
   2. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is not permitted.
   3. Signaling Line Circuits: Power-limited fire-alarm cables must not be installed in the same cable or pathway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

F. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

G. Wiring to Remote Alarm Transmitting Device: 1 inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.6 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inch of slack.

D. Comply with requirements in Section 284621.11 "Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

3.7 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.8 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.9 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.10 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each of the following visual and electrical tests:

    a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.

b. Test bolted connections for high resistance using one of the following:

1) A low-resistance ohmmeter.
2) Calibrated torque wrench.
3) Thermographic survey.

c. Inspect compression-applied connectors for correct cable match and indentation.
d. Inspect for correct identification.
e. Inspect cable jacket and condition.
f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

4. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Grounding and bonding conductors.
2. Grounding and bonding clamps.
3. Grounding and bonding bushings.
4. Grounding and bonding hubs.
5. Grounding and bonding connectors.
6. Intersystem bonding bridge grounding connector.
7. Grounding and bonding busbars.
8. Grounding (earthing) electrodes.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. For each type of product indicated.

B. Shop Drawings: Plans showing dimensioned locations of grounding features described in "Field Quality Control" Article, including the following:

1. Test wells.

2. Rod electrodes.
3. Ring electrodes.
4. Grounding arrangements and connections for separately derived systems.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

D. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Product Data: For each conductor and cable indicating lead content.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:

a. Plans showing locations of grounding features described in "Field Quality Control" Article, including the following:

1) Test wells.
2) Rod electrodes.
3) Ring electrodes.
4) Grounding arrangements and connections for separately derived systems.

b. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems based on NETA MTS.

1) Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment Grounding Conductor:

1. General Characteristics: 600 V, THHN/THWN-2 or THWN-2, copper tinned-copper wire or cable, green color, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. ASTM - Bare Copper Grounding and Bonding Conductor:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ERICO; brand of nVent Electrical plc.
b. Harger Lightning & Grounding; business of Harger, Inc.
c. Southwire Company LLC.
d. Or approved equal.

2. Referenced Standards: Complying with one or more of the following:

a. Soft or Annealed Copper Wire: ASTM B3
b. Concentric-Lay Stranded Copper Conductor: ASTM B8.
c. Tin-Coated Soft or Annealed Copper Wire: ASTM B33.
d. 19-Wire Combination Unilay-Stranded Copper Conductor: ASTM B787/B787M.

2.2 GROUNDING AND BONDING CLAMPS

A. Description: Clamps suitable for attachment of grounding and bonding conductors to grounding electrodes, pipes, tubing, and rebar. Grounding and bonding clamps specified in this article are also suitable for use with communications applications; see Section 270526 "Grounding and Bonding for Communications Systems," for selection and installation guidelines.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

3. Sustainability Characteristics:

a. Lead Content: Less than 300 parts per million.

D. UL KDER and KDSH - Hex-Fitting-Type Pipe and Rod Grounding and Bonding Clamp :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. America Fujikura Ltd. (AFL); Fujikura Ltd.
c. Arlington Industries, Inc.
d. Cooper B-line; brand of Eaton, Electrical Sector.
e. Crouse-Hinds; brand of Eaton, Electrical Sector.
f. ERICO; brand of nVent Electrical plc.
g. Galvan Industries, Inc.; Electrical Products Division, LLC.
h. Greaves Corp.; Essex Products Group, Inc.
i. Harger Lightning & Grounding; business of Harger, Inc.
j. ILSCO.
k. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
l. Panduit Corp.
m. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
n. Or approved equal.

2. General Characteristics:

a. Two pieces with zinc-plated stainless steel bolts.
b. Clamp Material: Silicon bronze Die-cast zinc alloy Brass Tinned brass.
c. Listed for outdoor use.

E. UL KDER and KDSH - U-Bolt-Type Pipe and Rod Grounding and Bonding Clamp :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. America Fujikura Ltd. (AFL); Fujikura Ltd.
c. Arlington Industries, Inc.
d. Cooper B-line; brand of Eaton, Electrical Sector.
e. Crouse-Hinds; brand of Eaton, Electrical Sector.
f. ERICO; brand of nVent Electrical plc.
g. Galvan Industries, Inc.; Electrical Products Division, LLC.
h. Greaves Corp.; Essex Products Group, Inc.
i. Harger Lightning & Grounding; business of Harger, Inc.
j. ILSCO.
k. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
l. Panduit Corp.
m. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
n. Or approved equal.

2. General Characteristics:

a. Clamp Material: Brass Tinned brass.
b. Listed for outdoor use.

F. UL KDER and KDSH - Strap-Type Pipe and Rod Grounding and Bonding Clamp :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
b. Crouse-Hinds; brand of Eaton, Electrical Sector.
c. ERICO; brand of nVent Electrical plc.
d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
e. Panduit Corp.
f. Or approved equal.

2. General Characteristics:

a. Clamp Material: Copper Tinned copper Galvanized steel.
b. Listed for outdoor use.

G. UL KDER - Beam Grounding and Bonding Clamp :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Anderson; brand of Hubbell Utility Solutions; Hubbell Incorporated.
c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Panduit Corp.
e. Penn-Union Corp.; subsidiary of Nesco, Inc.
f. Or approved equal.

2. General Characteristics: Mechanical-type, terminal, ground wire access from four directions; with dual, tin-plated or silicon bronze bolts.

H. UL KDER - Exothermically Welded Connection :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. ALLTEC LLC.
c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.
e. Crouse-Hinds; brand of Eaton, Electrical Sector.
f. ERICO; brand of nVent Electrical plc.
g. Harger Lightning & Grounding; business of Harger, Inc.
h. Or approved equal.

2. General Characteristics: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING AND BONDING BUSHINGS

A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures, and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Bonding Bushing :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
f. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
g. Or approved equal.

2. General Characteristics: Threaded bushing with insulated throat.

E. UL KDER - Grounding Bushing :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
f. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
g. Or approved equal.

2. General Characteristics: Threaded bushing with insulated throat and mechanical-type wire terminal.

2.4 GROUNDING AND BONDING HUBS

A. Description: Hubs with certified grounding or bonding locknut.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. Listing Criteria:

    a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Grounding and Bonding Hub :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Arlington Industries, Inc.
    c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    d. Crouse-Hinds; brand of Eaton, Electrical Sector.
    e. Greaves Corp.; Essex Products Group, Inc.
    f. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    g. Penn-Union Corp.; subsidiary of Nesco, Inc.
    h. Or approved equal.

2. General Characteristics: Insulated, gasketed, watertight hub with mechanical-type wire terminal.

2.5 GROUNDING AND BONDING CONNECTORS

A. Source Limitations: Obtain products from single manufacturer.

B. Performance Criteria:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. Listing Criteria:

    a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
    b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

C. UL KDER - Pressure-Type Grounding and Bonding Busbar Cable Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    c. Arlington Industries, Inc.
    d. Or approved equal.

2. General Characteristics: Copper or copper alloy, for compression bonding of one or more conductor directly to copper busbar. Listed for direct burial.

D. UL KDER - Lay-In Lug Mechanical-Type Grounding and Bonding Busbar Terminal :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB, Electrification Business.
   b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
   c. ILSCO.
   d. Or approved equal.

2. General Characteristics: Mechanical-type, copper terminal with set screw.

E. UL KDER - Crimped Lug Pressure-Type Grounding and Bonding Busbar Terminal :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB, Electrification Business.
   b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
   c. Harger Lightning & Grounding; business of Harger, Inc.
   d. ILSCO.
   e. Or approved equal.

2. General Characteristics: Cast silicon bronze, solderless compression-type wire terminals; with long barrel and two holes spaced on 5/8 or 1 inch centers for two-bolt connection to busbar.

F. UL KDER - Split-Bolt Service-Post Pressure-Type Grounding and Bonding Busbar Terminal :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Panduit Corp.
   b. ABB, Electrification Business.
   c. Burndayl brand of Hubbell Electrical Solutions; Hubbell Incorporated.
   d. Or approved equal.

2. General Characteristics: Bolts that surround cable and bond to cable under compression when nut is tightened after assembly is screwed into busbar opening.

G. UL KDER - Crimped Pressure-Type Grounding and Bonding Cable Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB, Electrification Business.
   b. allG Fabrication; business of Advanced Lightning Technology, Ltd.
   c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
   d. ILSCO.
   e. Or approved equal.

2. General Characteristics: Crimp-and-compress connectors that bond to conductor when connector is compressed around conductor.

    a. Copper, C and H shaped.

H. UL KDER - Split-Bolt Pressure-Type Grounding and Bonding Cable Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. allG Fabrication; business of Advanced Lightning Technology, Ltd.
    c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    d. ERICO; brand of nVent Electrical plc.
    e. Greaves Corp.; Essex Products Group, Inc.
    f. Or approved equal.

2. General Characteristics: Bolts that surround cable and bond to cable under compression when nut is tightened.

    a. Copper.

I. UL KDER - Signal Reference Grid Grounding and Bonding Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    c. Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.
    d. Cooper B-line; brand of Eaton, Electrical Sector.
    e. ERICO; brand of nVent Electrical plc.
    f. Harger Lightning & Grounding; business of Harger, Inc.
    g. Or approved equal.

2. General Characteristics: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

2.6 INTERSYSTEM BONDING BRIDGE GROUNDING CONNECTORS

A. Description: Devices that provide means for connecting communications systems grounding and bonding conductors at service equipment or at disconnecting means for buildings or structures.

B. Performance Criteria:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

C. UL KDSH - One-Piece Intersystem Bonding Bridge Grounding Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Galvan Industries, Inc.; Electrical Products Division, LLC.
b. Madison Electric Products; business of Southwire Company, LLC.
c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Or approved equal.

2. General Characteristics: Zinc-alloy one-piece construction; six terminating points; gangable.

D. UL KDSH - Two-Piece Intersystem Bonding Bridge Grounding Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
b. Crouse-Hinds; brand of Eaton, Electrical Sector.
c. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Or approved equal.

2. General Characteristics: Zinc-alloy Copper body and polycarbonate cover; four terminating points.

2.7 GROUNDING AND BONDING BUSBARS

A. Description: Miscellaneous grounding and bonding device that serves as common connection for multiple grounding and bonding conductors.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

3. Sustainability Characteristics:

a. Lead Content: Less than 300 parts per million.

D. UL KDER - Equipment Room Grounding and Bonding Busbar :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. allG Fabrication; business of Advanced Lightning Technology, Ltd.
    b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    c. Chatsworth Products, Inc.
    d. Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.
    e. Cooper B-line; brand of Eaton, Electrical Sector.
    f. ERICO; brand of nVent Electrical plc.
    g. Harger Lightning & Grounding; business of Harger, Inc.
    h. Hoffman; brand of nVent Electrical plc.
    i. ILSCO.
    j. Panduit Corp.
    k. Or approved equal.

2. General Characteristics:

    a. Bus: Rectangular bar of annealed copper.
    b. Mounting Stand-Off Insulators: Lexan or PVC.

        1) Comply with UL 891 for use in 600 V switchboards, impulse tested at 5000 V.

3. Options:

    a. Dimensions: 1/4 by 4 inch in cross section; length as indicated on Drawings.
    b. Predrilled Hole Pattern: 9/32 inch holes spaced 1-1/8 inch apart Suitable for installing specified grounding and bonding connectors.
    c. Mounting Hardware: Stand-off brackets that provide 2 inch 4 inch clearance to access rear of bus. Brackets and bolts must be stainless steel.

E. UL KDER - Rack and Cabinet Bonding Busbar :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Chatsworth Products, Inc.
    b. Cooper B-line; brand of Eaton, Electrical Sector.
    c. Harger Lightning & Grounding; business of Harger, Inc.
    d. Hoffman; brand of nVent Electrical plc.
    e. Panduit Corp.
    f. Or approved equal.

2. General Characteristics:

    a. Bus: Rectangular bar of hard-drawn solid copper.
    b. Horizontal Mounting Dimensions: Designed for mounting in 19 inch 23 inch wide equipment racks or cabinets.
    c. Vertical Mounting Dimensions: Designed for mounting in 72 inch 36 inch high equipment racks or cabinets.
    d. Predrilled Hole Pattern: Accepts connectors for grounding and bonding conductor sizes 14 AWG to 2/0 AWG.

e. Mounting Hardware: Stainless steel or copper-plated, for attachment to rack.

2.8 GROUNDING (EARTHING) ELECTRODES

A. Description: Grounding electrodes include rod electrodes, ring electrodes, metal underground water pipes, metal building frames, concrete-encased electrodes, and pipe and plate electrodes.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Rod Electrode :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. allG Fabrication; business of Advanced Lightning Technology, Ltd.
c. Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.
d. ERICO; brand of nVent Electrical plc.
e. Galvan Industries, Inc.; Electrical Products Division, LLC.
f. Harger Lightning & Grounding; business of Harger, Inc.
g. Or approved equal.

2. General Characteristics: Copper-clad Zinc-coated steel, sectional type; 3/4 inch by 10 ft 5/8 inch by 8 ft.

E. UL KDER - Plate Electrode :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ALLTEC LLC.
b. Galvan Industries, Inc.; Electrical Products Division, LLC.
c. ABB, Electrification Business.
d. Or approved equal.

2. General Characteristics: 1/4 inch thick, hot-dip galvanized.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine facility's grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of electrical system.

B. Inspect test results of grounding system measured at point of electrical service equipment connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of electrical service equipment only after unsatisfactory conditions have been corrected.

3.3 SELECTION OF BUSBARS

A. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inch minimum from wall, 6 inch above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.4 SELECTION OF GROUNDING AND BONDING CONDUCTORS

A. Conductors: Install solid conductor for 8 AWG and smaller, and stranded conductors for 6 AWG and larger unless otherwise indicated.

B. Custom-Length Insulated Equipment Bonding Jumpers: 6 AWG, 19-strand, Type THHN.

C. Bonding Cable: 28 kcmil, 14 strands of 17 AWG conductor, 1/4 inch in diameter.

D. Bonding Conductor: 4 AWG or 6 AWG, stranded conductor.

E. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.

F. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.

G. Underground Grounding Conductors: Install bare copper conductor, 2/0 AWG minimum.

1. Bury at least 30 inch below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.

3.5 SELECTION OF CONNECTORS

A. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.6 SELECTION OF SIGNAL REFERENCE GRIDS

A. Access Floor Signal Reference Grid:

1. Install 6 AWG bonding conductors in a grid pattern under floor.

a. Install grid bonding conductors on 4 ft centers, so as to permit bonding of one structural pedestal for each access floor tile. Connect grid conductors together where they cross each other.

3.7 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Techniques:

1. Conductors:

a. Route along shortest and straightest paths possible unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

2. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

    a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
    b. Make connections with clean, bare metal at points of contact.
    c. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
    d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
    e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
    f. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

        1) Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate adjacent parts.
        2) Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
        3) Use exothermic-welded connectors for outdoor locations; if disconnect-type connection is required, use bolted clamp.

    g. Grounding and Bonding for Piping:

        1) Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use bolted clamp connector or bolt lug-type connector to pipe flange by using one of lug bolts of flange. Where dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
        2) Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with bolted connector.
        3) Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

    h. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
    i. Grounding for Steel Building Structure: Install driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 ft apart.

3. Electrodes:

    a. Ground Rods: Drive rods until tops are 2 inch below finished floor or final grade unless otherwise indicated.

1) Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2) Use exothermic welds for below-grade connections.

b. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least same distance from other grounding electrodes, and connect to service grounding electrode conductor.
c. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes must be at least 12 inch deep, with cover.

1) Install at least one test well for each service unless otherwise indicated. Install at ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

d. Ring Electrode: Install grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around perimeter of building.

1) Install tinned-copper conductor not less than 2/0 AWG for ring electrode and for taps to building steel.
2) Bury ring electrode not less than 24 inch from building's foundation.

e. Concrete-Encased Electrode (Ufer Ground):

1) Fabricate in accordance with NFPA 70; use minimum of 20 ft of bare copper conductor not smaller than 4 AWG.

a) If concrete foundation is less than 20 ft long, coil excess conductor within base of foundation.
b) Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

2) Fabricate in accordance with NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 ft long. If reinforcing is in multiple pieces, connect together by usual steel tie wires or exothermic welding to create required length.

4. Grounding at Service:

a. Equipment grounding conductors and grounding electrode conductors must be connected to ground bus. Install main bonding jumper between neutral and ground buses.

5. Grounding Separately Derived Systems:

a. Generator: Install grounding electrode(s) at generator location. Electrode must be connected to equipment grounding conductor and to frame of generator.

6. Grounding Underground Distribution System Components:

a. Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.
b. Comply with IEEE C2 grounding requirements.
c. Pad-Mounted Transformers and Switches: Install two ground rods and ring electrode around pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than 2 AWG for ring electrode and for taps to equipment grounding terminals. Bury ring electrode not less than 6 inch from foundation.

7. Equipment Grounding:

a. Install insulated equipment grounding conductors with feeders and branch circuits.
b. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1) Feeders and branch circuits.
2) Lighting circuits.
3) Receptacle circuits.
4) Single-phase motor and appliance branch circuits.
5) Three-phase motor and appliance branch circuits.
6) Flexible raceway runs.
7) Armored and metal-clad cable runs.
8) Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

c. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
d. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
e. Isolated Grounding Receptacle Circuits: Install insulated equipment grounding conductor connected to receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of applicable derived system or service unless otherwise indicated.
f. Isolated Equipment Enclosure Circuits: For designated equipment supplied by branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of applicable derived system or service unless otherwise indicated.

3.8 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by NYC Department of Buildings Inspector.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with calibrated torque wrench in accordance with manufacturer's published instructions.
3. Test completed grounding system at each location where maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method in accordance with IEEE Std 81.
    c. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Commissioner promptly and include recommendations to reduce ground resistance.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to record of tests and observations. Include number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Nonconforming Work:

1. Grounding system will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective components and retest.

D. Collect, assemble, and submit test and inspection reports.

1. Report measured ground resistances that exceed the following values:

    a. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohm(s).
    b. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohm(s).
    c. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohm(s).
    d. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s) .
    e. .

3.9 PROTECTION

A. After installation, protect grounding and bonding cables and equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Support, anchorage, and attachment components.
2. Fabricated metal equipment support assemblies.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Slotted support systems, hardware, and accessories.
b. Clamps.
c. Hangers.
d. Sockets.
e. Eye nuts.
f. Fasteners.
g. Anchors.
h. Saddles.
i. Brackets.

2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: Signed and sealed by a qualified professional engineer licensed in the State of New York. For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Engineering Services Submittals: For hangers and supports for electrical systems.

1. Include design calculations and details of hangers.
2. Include design calculations for seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified structural professional engineer licensed in the State of New York as defined in DDC General Conditions, to design hanger and support system.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB (Electrification Products Division).

b. Allied Tube & Conduit; Atkore International.
c. CADDY; brand of nVent Electrical plc.
d. Cooper B-line; brand of Eaton, Electrical Sector.
e. G-Strut.
f. Haydon Corporation.
g. Metal Ties Innovation.
h. MIRO Industries.
i. Rocket Rack; Robroy Industries.
j. Unistrut; Atkore International.
k. Wesanco, Inc.
l. Or Approved Equal.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Selected for applicable load criteria 1-5/8 inch 1-1/4 inch 13/16 inch.
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) MKT Fastening, LLC.
2) Hilti, Inc.
3) Dewalt
4) Or Approved equal.

2. Mechanical-Expansion Anchors: Insert wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cooper B-line; brand of Eaton, Electrical Sector.
2) Hilti, Inc.
3) MKT Fastening, LLC.
4) Or approved equal.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
6. Toggle Bolts: All Stainless steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 SELECTION

A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA NEIS 101

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533.13 "Conduits for Electrical Systems."

D. Comply with requirements for boxes specified in Section 260533.16 "Boxes and Covers for Electrical Systems."

E. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by scheduled in NECA NEIS 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size must be 1/4 inch in diameter.

F. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

G. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.3 INSTALLATION OF SUPPORTS

A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA NEIS 1, EMT may be supported by openings through structure members, in accordance with NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inch thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inch thick.
6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts .
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.4 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M. Submit welding certificates.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inch larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000 psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.6 PAINTING

A. Touchup:

1. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

    a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 260529

SECTION 260533.13 - CONDUITS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Type EMT-A and Type EMT-SS duct raceways and elbows.
2. Type EMT-S duct raceways and elbows.
3. Type HDPE and Type EPEC duct raceways and fittings.
4. Type ERMC-S duct raceways, elbows, couplings, and nipples.
5. Type FMT duct raceways.
6. Type LFMC duct raceways.
7. Type PVC duct raceways and fittings.
8. Fittings for conduit, tubing, and cable.
9. Electrically conductive corrosion-resistant compounds for threaded conduit.
10. Solvent cements.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260519 "Low-Voltage for Electrical Power Conductors and Cables" for nonmetallic underground conduit with conductors (Type NUCC).

1.3 DEFINITIONS

A. Conduit: A structure containing one or more duct raceways.

B. Duct Raceway: A single enclosed raceway for conductors or cable.

C. Duct Bank: An arrangement of conduit providing one or more continuous duct raceways between two points.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Type EMT-A and Type EMT-SS duct raceways and elbows.
2. Type EMT-S duct raceways and elbows.
3. Type HDPE and Type EPEC duct raceways and fittings.
4. Type ERMC-S duct raceways, elbows, couplings, and nipples.
5. Type FMT duct raceways.
6. Type LFMC duct raceways.
7. Type PVC duct raceways and fittings.
8. Fittings for conduit, tubing, and cable.
9. Electrically conductive corrosion-resistant compounds for threaded conduit.
10. Solvent cements.

B. Sustainable design submittals.

1. Solvent cements.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions:

1. Type EMT-A and Type EMT-SS duct raceways and elbows.
2. Type EMT-S duct raceways and elbows.
3. Type HDPE and Type EPEC duct raceways and fittings.
4. Type ERMC-S duct raceways, elbows, couplings, and nipples.
5. Type FMT duct raceways.
6. Type LFMC duct raceways.
7. Type PVC duct raceways and fittings.
8. Fittings for conduit, tubing, and cable.
9. Electrically conductive corrosion-resistant compounds for threaded conduit.
10. Solvent cements.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 TYPE EMT-A AND TYPE EMT-SS DUCT RACEWAYS AND ELBOWS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN FJMX; including UL 797A.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

2.2 TYPE EMT-S DUCT RACEWAYS AND ELBOWS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN FJMX; including UL 797.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL FJMX - Steel Electrical Metal Tubing (EMT-S) and Elbows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit; Atkore International.
b. Calconduit; Atkore International.
c. Emerson Electric Co.
d. Picoma; Zekelman Industries.
e. Republic Conduit; Nucor Corporation, Nucor Tubular Products.
f. Topaz Lighting & Electric.
g. Western Tube; Zekelman Industries.
h. Wheatland Tube; Zekelman Industries.
i. Or approved equal.

2. Material: Steel.

3. Options:

    a. Exterior Coating: Zinc Alternate corrosion-resistant coating.
    b. Interior Coating: Zinc with organic top coating Zinc.
    c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
    d. Colors: As indicated on Drawings.

2.3 TYPE HDPE AND TYPE EPEC DUCT RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL EAZX - Schedule 80 Electrical HDPE Underground Conduit (HDPE-80):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Blue Diamond Industries.
    b. JM Eagle; J-M Manufacturing Co., Inc.
    c. Petroflex North America.
    d. Prysmian Cables and Systems; Prysmian Group North America.
    e. Southwire Company, LLC.
    f. Or approved equal.

2. Dimensional Specifications: Schedule 80.
3. Options:

    a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

2.4 TYPE ERMC-S DUCT RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DYIX; including UL 6.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DYIX - Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit; Atkore International.
b. Calconduit; Atkore International.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Patriot Aluminum Products, LLC.
f. Republic Conduit; Nucor Corporation, Nucor Tubular Products.
g. Topaz Lighting & Electric.
h. Western Tube; Zekelman Industries.
i. Wheatland Tube; Zekelman Industries.
j. Or approved equal.

2. Exterior Coating: Zinc.
3. Options:

a. Interior Coating: Zinc with organic top coating Zinc.
b. Minimum Trade Size: Metric designator 21 (trade size 3/4).
c. Colors: As indicated on Drawings.

2.5 TYPE FMT DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN ILJW; including UL Subject 1652.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL ILJW - Steel Flexible Metallic Tubing (FMT):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Electri-Flex Company.
b. International Metal Hose Co.
c. Liquid Tight Connector Co.
d. Southwire Company, LLC.

e. Or approved equal.

2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

2.6 TYPE LFMC DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DXHR; including UL 360.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DXHR - Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Material: Steel.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

2.7 TYPE PVC DUCT RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DZYR; including UL 651.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DZYR - Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Calconduit; Atkore International.
c. JM Eagle; J-M Manufacturing Co., Inc.
d. NAPCO; Westlake Chemical Corp.
e. Opti-Com Manufacturing Network, Inc (OMNI).
f. Topaz Lighting & Electric.
g. Or approved equal.

2. Dimensional Specifications: Schedule 40.
3. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Markings: For use with maximum 90 deg C wire For directional boring applications.

D. UL DZYR - Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Calconduit; Atkore International.
c. JM Eagle; J-M Manufacturing Co., Inc.
d. Opti-Com Manufacturing Network, Inc (OMNI).
e. Topaz Lighting & Electric.
f. Or approved equal.

2. Dimensional Specifications: Schedule 80.
3. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Markings: For use with maximum 90 deg C wire.

2.8 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DWTT - Fittings for Type ERMC, Type IMC, Type PVC, Type HDPE, Type EPEC, and Type RTRC Duct Raceways:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Crouse-Hinds; brand of Eaton, Electrical Sector.
    c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
    d. Konkore Fittings; Atkore International.
    e. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    f. Penn Aluminum Conduit & EMT.
    g. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    h. Southwire Company, LLC.
    i. Topaz Lighting & Electric.
    j. Or approved equal.

2. Listing Criteria: UL CCN DWTT; including UL 514B.
3. Options:

    a. Material: Steel.
    b. Coupling Method: Compression coupling Raintight compression coupling with distinctive color gland nut Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.
    c. Expansion and Deflection Fittings: UL 651 with flexible bonding jumper.

D. UL FKAV - Fittings for Type EMT Duct Raceways:

1. Manufacturers Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Allied Tube & Conduit; Atkore International.
    c. Calconduit; Atkore International.
    d. Crouse-Hinds; brand of Eaton, Electrical Sector.
    e. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
    f. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    g. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    h. Southwire Company, LLC.
    i. Topaz Lighting & Electric.
    j. Or approved equal.

2. Listing Criteria: UL CCN FKAV; including UL 514B.
3. Options:

    a. Material: Steel.
    b. Coupling Method: Compression coupling Raintight compression coupling with distinctive color gland nut Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.
    c. Expansion and Deflection Fittings: UL 651 with flexible bonding jumper.

E. UL DXAS - Fittings for Type LFMC and Type LFNC Duct Raceways:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Liquid Tight Connector Co.
b. ABB, Electrification Business.
c. Southwire Company, LLC.
d. Or approved equal.

2. Listing Criteria: UL CCN DXAS; including UL 514B.

2.9 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS FOR THREADED CONDUIT

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN FOIZ; including UL Subject 2419.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL FOIZ - Electrically Conductive Corrosion-Resistant Compound for Threaded Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Southwire Company, LLC.
c. Thomas & Betts
d. Or approved equal.

2.10 SOLVENT CEMENTS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and NYCEC, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DWTT; including UL 514B.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of duct raceways. Consult Commissioner for resolution of conflicting requirements.

B. Special Instructions Regarding HDPE Conduits: Although Article 353 of NFPA 70 permits use of HDPE conduits where encased in concrete aboveground, UL CCN EAZX listing requirements state that HDPE underground conduits are intended only for use where direct buried with or without being encased in concrete. Specified Type HDPE underground conduits are not permitted to be used aboveground on Project.

C. Outdoors:

1. Exposed and Subject to Severe Physical Damage: ERMC.
2. Exposed and Subject to Physical Damage: ERMC.
    a. Locations less than 2.5 m (8 ft) above finished floor.
3. Exposed and Not Subject to Physical Damage: ERMC PVC-80.
4. Concealed Aboveground: ERMC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

D. Indoors:

1. Exposed and Subject to Severe Physical Damage: ERMC. Locations include the following:
    a. Mechanical rooms.
2. Exposed and Subject to Physical Damage: ERMC EMT. Locations include the following:
    a. Locations less than 2.5 m (8 ft) above finished floor.
    b. Stub-ups to above suspended ceilings.
3. Exposed and Not Subject to Physical Damage: EMT.
4. Use MC type copper cable for lighting and power circuits in concealed loctions.
5. Damp or Wet Locations: ERMC Corrosion-resistant EMT.
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC, FMC, LFNC-A, or LFNC-B.

E. Duct Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded-type fittings unless otherwise indicated.

F. Underground:

1. PVC Schedule 80 or HDPE Schedule 80 type.
2. Raceways to/from underground penetrating through the floor slab shall be RGS type.

3.3 INSTALLATION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Type EMT-A: Article 358 of NFPA 70, NYCEC and NECA NEIS 102.
2. Type EMT-SS: Article 358 of NFPA 70, NYCEC and NECA NEIS 101.
3. Type EMT-S: Article 358 of NFPA 70, NYCEC and NECA NEIS 101.
4. Type HDPE and Type EPEC: Article 353 of NFPA 70 and NECA NEIS 111.
5. Type ERMC-SS: Article 344 of NFPA 70, NYCEC and NECA NEIS 101.
6. Type ERMC-S: Article 344 of NFPA 70, NYCEC and NECA NEIS 101.
7. Type FMT: Article 360 of NFPA 70, NYCEC and NECA NEIS 101.
8. Type LFMC: Article 350 of NFPA 70, NYCEC and NECA NEIS 101.
9. Type PVC: Article 356 of NFPA 70, NYCEC and NECA NEIS 111.
10. Expansion Fittings: NEMA FB 2.40.

C. Special Installation Techniques:

1. General Requirements for Installation of Duct Raceways:

a. Complete duct raceway installation before starting conductor installation.
b. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
c. Install no more than equivalent of three 90-degree bends in conduit run. Support within 12 inch of changes in direction.
d. Make bends in duct raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
e. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
f. Support conduit within 12 inch of enclosures to which attached.
g. Install duct sealing fittings at accessible locations in accordance with NFPA 70 and NYCEC and fill them with listed sealing compound. For concealed duct raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install duct sealing fittings in accordance with NFPA 70.

h. Install devices to seal duct raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of duct raceways at the following points:

1) Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2) Where an underground service duct raceway enters a building or structure.
3) Conduit extending from interior to exterior of building.
4) Conduit extending into pressurized duct raceway and equipment.
5) Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6) Where otherwise required by NFPA 70 and NYCEC.

i. Do not install duct raceways or electrical items on "explosion-relief" walls or rotating equipment.
j. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
k. Keep duct raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal duct raceway runs above water and steam piping.
l. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
m. Install pull wires in empty duct raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground duct raceways designated as spare above grade alongside duct raceways in use.
n. Install duct raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.

1) Termination fittings with shoulders do not require two locknuts.

o. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts..

2. Types EMT-A, ERMC-A, and FMC-A: Do not install aluminum duct raceways or fittings in contact with concrete or earth.
3. Types ERMC and IMC:

a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of duct raceway and fittings before making up joints. Follow compound manufacturer's published instructions.

4. Types FMC, LFMC, and LFNC:

a. Provide a maximum of 36 inch of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

5. Types PVC, HDPE, and EPEC:

a. Do not install Type PVC, Type HDPE, or Type EPEC conduit where ambient temperature exceeds 122 deg F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted.
b. Comply with manufacturer's published instructions for solvent welding and fittings.

6. Duct Raceways Embedded in Slabs:

a. Run duct raceways larger than metric designator 27 (trade size 1) below concrete slab.
b. Arrange duct raceways to cross building expansion joints with expansion fittings at right angles to the joint.
c. Arrange duct raceways to ensure that each is surrounded by minimum of 1 inch of concrete without voids.
d. Do not embed threadless fittings in concrete unless locations have been specifically approved by Commissioner.

7. Stub-ups to Above Recessed Ceilings:

a. Provide EMT, IMC, or ERMC for duct raceways.
b. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

8. Duct Raceway Terminations at Locations Subject to Moisture or Vibration:

a. Provide insulating bushings to protect conductors, including conductors smaller than 4 AWG..

9. Duct Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

a. ERMC-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
b. EMT: Provide compression, steel fittings. Comply with NEMA FB 2.10.
c. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

10. Expansion-Joint Fittings:

a. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft. Install in runs of aboveground ERMC and EMT conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft.
b. Install type and quantity of fittings that accommodate temperature change listed for the following locations:

1) Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.

c. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
d. Install expansion fittings at locations where conduits cross building or structure expansion joints.
e. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's published instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

11. Duct Raceways Penetrating Rooms or Walls with Acoustical Requirements: Seal duct raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.
12. Identification: Provide labels for conduit assemblies, duct raceways, and associated electrical equipment.

D. Interfaces with Other Work:

1. Coordinate installation of new products for with existing conditions.

2. Coordinate with Section 078413 "Penetration Firestopping" for installation of firestopping at penetrations of fire-rated floor and wall assemblies.
3. Coordinate with Section 260529 "Hangers and Supports for Electrical Systems" for installation of conduit hangers and supports.

3.4 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533.13

SECTION 260533.16 - BOXES AND COVERS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Junction boxes and pull boxes.
3. Cover plates for device boxes.
4. Hoods for outlet boxes.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Junction boxes and pull boxes.
3. Cover plates for device boxes.
4. Hoods for outlet boxes.

B. Shop Drawings:

1. Shop drawings for floor boxes.

C. Samples:

1. Floor box samples for initial selection.
2. Raised floor box samples for initial selection.
3. Recessed access-floor box samples for initial selection.
4. Concrete box samples for initial selection.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Junction boxes and pull boxes.
3. Cover plates for device boxes.
4. Hoods for outlet boxes.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN QCIT; including UL 514A.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
3. Samples:

a. Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
b. Recessed Access-Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
c. Concrete Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.

C. UL QCIT - Metallic Outlet Boxes and Covers:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Arlington Industries, Inc.
    c. Crouse-Hinds; brand of Eaton, Electrical Sector.
    d. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
    e. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    f. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    g. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    h. MonoSystems, Inc.
    i. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    j. Pass & Seymour; Legrand North America, LLC.
    k. Patriot Aluminum Products, LLC.
    l. Plasti-Bond; Robroy Industries.
    m. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    n. Spring City Electrical Manufacturing Company.
    o. Topaz Lighting & Electric.
    p. Wiremold; Legrand North America, LLC.
    q. Or approved equal.

3. Options:

    a. Material: Cast metal.
    b. Cast-Metal Depth: Minimum or 2.4 inch.
    c. Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing up to 50 lb more than 50 lb and marked with maximum allowable weight.
    d. Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.

D. UL QCIT - Metallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Crouse-Hinds; brand of Eaton, Electrical Sector.
    c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
    d. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    e. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    f. Pass & Seymour; Legrand North America, LLC.
    g. Patriot Aluminum Products, LLC.
    h. Plasti-Bond; Robroy Industries.

i. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
j. Topaz Lighting & Electric.
k. Or approved equal.

E. UL QCIT - Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
e. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
f. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
g. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
h. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
i. Patriot Aluminum Products, LLC.
j. Plasti-Bond; Robroy Industries.
k. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
l. Topaz Lighting & Electric.
m. Or approved equal.

3. Options:

a. Material: Sheet steel, cast metal.
b. Sheet Metal Depth: minimum 2.5 inch.
c. Cast-Metal Depth: minimum 2.4 inch.

F. UL QCIT - Metallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Cooper B-line; brand of Eaton, Electrical Sector.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
e. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
f. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
g. Pass & Seymour; Legrand North America, LLC.
h. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
i. Topaz Lighting & Electric.
j. Or approved equal.

G. UL QCIT - Metallic Floor Boxes and Floor Box Covers:

1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. AFC Cable Systems; Atkore International.
    c. Arlington Industries, Inc.
    d. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    e. FSR Inc.
    f. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    g. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    h. Leviton Manufacturing Co., Inc.
    i. Pass & Seymour; Legrand North America, LLC.
    j. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    k. Wiremold; Legrand North America, LLC.
    l. Or approved equal.

2.2 JUNCTION BOXES AND PULL BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN BGUZ; including UL 50 and UL 50E.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Sustainable Design Submittals: Prepare and submit the following documentation for adhesive solvents:

    a. Product data indicating VOC content less than 510 g/L or less for PVC conduit and fittings.

3. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL BGUZ - Indoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Adalet.
    b. Cooper B-line; brand of Eaton, Electrical Sector.
    c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
    d. FSR Inc.
    e. Hoffman; brand of nVent Electrical plc.
    f. Hubbell Industrial Controls; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    g. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    h. Milbank Manufacturing Co.

i. N J Sullivan Company.
j. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
k. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
l. Spring City Electrical Manufacturing Company.
m. Square D; Schneider Electric USA.
n. Or approved equal.

3. Options:

a. Degree of Protection: Type 2 or Type 5

D. |UL BGUZ - Indoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adalet.
b. Crouse-Hinds; brand of Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
e. Or approved equal.

3. Options:

a. Degree of Protection: Type 5

E. UL BGUZ - Outdoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adalet.
b. Cooper B-line; brand of Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
d. FSR Inc.
e. Hoffman; brand of nVent Electrical plc.
f. Hubbell Industrial Controls; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
g. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
h. Milbank Manufacturing Co.
i. N J Sullivan Company.
j. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
k. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
l. Spring City Electrical Manufacturing Company.
m. Square D; Schneider Electric USA.
n. Or approved equal.

3. Options:

a. Degree of Protection: Type 3SX

F. |UL BGUZ - Outdoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adalet.
b. Crouse-Hinds; brand of Eaton, Electrical Sector.
c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
e. Or approved equal.

3. Options:

a. Degree of Protection: Type 3

2.3 COVER PLATES FOR DEVICES BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN QCIT or UL CCN QCMZ; including UL 514D.
3. Wallplate-Securing Screws: Metal with head color to match wallplate finish.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Sustainable Design Submittals: Prepare and submit the following documentation for adhesive solvents:

a. Product data indicating VOC content less than 510 g/L or less for PVC conduit and fittings.

3. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL QCIT or QCMZ - Metallic Cover Plates for Device Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
e. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

f. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
g. Intermatic, Inc.
h. Leviton Manufacturing Co., Inc.
i. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
j. Panduit Corp.
k. Pass & Seymour; Legrand North America, LLC.
l. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
m. Topaz Lighting & Electric.
n. Wiremold; Legrand North America, LLC.
o. Or approved equal.

2. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: As indicated on architectural Drawings.

D. UL QCIT or QCMZ - Nonmetallic Cover Plates for Device Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
d. Crouse-Hinds; brand of Eaton, Electrical Sector.
e. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
f. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
g. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
h. Intermatic, Inc.
i. Leviton Manufacturing Co., Inc.
j. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
k. Panduit Corp.
l. Pass & Seymour; Legrand North America, LLC.
m. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
n. Topaz Lighting & Electric.
o. Wiremold; Legrand North America, LLC.
p. Or approved equal.

2. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: As indicated on architectural Drawings.
c. Color: As indicated on architectural Drawings.

E. UL QCIT or QCMZ - Illuminating Cover Plates for Device Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Leviton Manufacturing Co., Inc.

b. ABB, Electrification Business.
c. Hubbell
d. Or approved equal.

2. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: As indicated on architectural Drawings.
c. Color: As indicated on architectural Drawings.

2.4 HOODS FOR OUTLET BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria:

a. UL CCN QCIT or UL CCN QCMZ; including UL 514D.
b. Receptacle, Hood, Cover Plate, Gaskets, and Seals: UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.

3. Mounts to box using fasteners different from wiring device.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL QCIT or QCMZ - Retractable or Reattachable Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
c. Leviton Manufacturing Co., Inc.
d. Or approved equal.

2. Options:

a. Provides clear gray white, weatherproof, "while-in-use" cover.

D. UL QCIT or QCMZ - Extra-Duty, While-in-Use Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Allied Tube & Conduit; Atkore International.
c. Arlington Industries, Inc.
d. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
e. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
f. Intermatic, Inc.
g. Leviton Manufacturing Co., Inc.
h. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
i. Or approved equal.

2. Additional Characteristics: Marked "Extra-Duty" in accordance with UL 514D.
3. Options:

a. Provides clear gray white, weatherproof, "while-in-use" cover.
b. Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Shop Drawings: Prepare and submit the following:

1. Shop Drawings for Floor Boxes: Show that floor boxes are located to avoid interferences and are structurally allowable. Indicate floor thickness where boxes are embedded in concrete floors and underfloor clearances where boxes are installed in raised floors.

3.3 SELECTION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Commissioner for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. Type 3 unless otherwise indicated.
b. Locations Exposed to Hosedown: Type 4.
c. Locations Subject to Potential Flooding: Type 6P.
d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
e. Locations in-Ground or Exposed to Corrosive Agents: Type 3RX.

f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.

2. Indoors:

a. Type 1 unless otherwise indicated.
b. Damp or Dusty Locations: Type 12.
c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
d. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
e. Locations Exposed to Airborne Dust, Lint, Fibers, or Flyings: Type 4.
f. Locations Exposed to Hosedown: Type 4.
g. Locations Exposed to Brief Submersion: Type 6.
h. Locations Exposed to Prolonged Submersion: Type 6P.
i. Locations Exposed to Corrosive Agents: Type 4X.
j. Locations Exposed to Spraying Oil or Coolants: Type 13.

C. Exposed Boxes Installed Less Than 2.5 m (8 ft) Above Floor:

1. Provide cast-metal boxes.
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.4 INSTALLATION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Outlet, Device, Pull, and Junction Boxes: Article 314 of NFPA 70.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
2. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
3. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.
4. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
5. Locate boxes so that cover or plate will not span different building finishes.
6. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
7. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.

8. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
9. Set metal floor boxes level and flush with finished floor surface.
10. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
11. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
12. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
13. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:

    a. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
    b. Provide gaskets for wallplates and covers.

14. Identification: Provide labels for boxes and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Provide warning signs.
    c. Label each box with engraved metal or laminated-plastic nameplate.

D. Interfaces with Other Work:

1. Coordinate with Section 260573.13 "Short-Circuit Studies" for determining available fault current on input feeder.
2. Coordinate with Section 260573.19 "Arc-Flash Hazard Analysis" for determining arc-flash hazard on input feeder.

3.5 CLEANING

A. Remove construction dust and debris from boxes before installing wallplates, covers, and hoods.

3.6 PROTECTION

A. After installation, protect boxes from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 260533.16

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Round sleeves.
2. Rectangular sleeves.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.
6. Pourable sealants.
7. Foam sealants.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 SUBMITTAL PROCEDURES'

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.

2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 ROUND SLEEVES

A. Steel Wall Sleeves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advance Products & Systems, LLC.
b. CCI Piping Systems.
c. Flexicraft Industries.
d. GPT; an EnPro Industries company.
e. Or approved equal.

2. General Characteristics: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends and integral waterstop.

B. Cast-Iron Wall Sleeves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Ductile Iron Pipe.
b. Flexicraft Industries.
c. McWane Ductile.
d. Or approved equal.

2. General Characteristics: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.

C. Round, Galvanized-Steel, Sheet Metal Sleeves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benefast.
b. Specified Technologies, Inc.
c. Advance Products & Systems, LLC.
d. Or approved equal.

2. General Characteristics: Galvanized-steel sheet; thickness not less than 0.0239 inch; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

2.2 RECTANGULAR SLEEVES

A. Rectangular, Galvanized-Steel, Sheet Metal Sleeves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Abesco Fire LLC.
b. Specified Technologies, Inc.
c. Wiremold; Legrand North America, LLC.
d. Or approved equal.

2. General Characteristics:

a. Material: Galvanized sheet steel.
b. Minimum Metal Thickness:

1) For sleeve cross-section rectangle perimeter less than 50 inch and with no side larger than 16 inch, thickness must be 0.052 inch.
2) For sleeve cross-section rectangle perimeter not less than 50 inch or with one or more sides larger than 16 inch, thickness must be 0.138 inch.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. BWM Company.
3. CALPICO, Inc.
4. Flexicraft Industries.
5. GPT; a division of EnPRO Industries.
6. Metraflex Company (The).
7. Proco Products, Inc.
8. Or approved equal.

B. General Characteristics: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable or between raceway and cable.

C. Options:

1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. HoldRite; Reliance Worldwide Company.
2. Advance Product & Systems, Inc.
3. Flexicraft Industries.
4. Or approved equal.

B. General Characteristics: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit must have plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. W.R. Meadows, Inc.
2. Advance Product & Systems, Inc.
3. Flexicraft Industries.
4. Or approved equal.

B. General Characteristics: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Design Mix: 5000 psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.6 POURABLE SEALANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carlisle SynTec Incorporated.
2. GAF.
3. Johns Manville; a Berkshire Hathaway company.
4. Or approved equal.

B. Performance Criteria:

1. Sustainability Characteristics:

a. Sealant must have a VOC content of g/L or less.

2.7 FOAM SEALANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dow Chemical Company (The).
2. Innovative Chemical Products (Building Solutions Group).
3. Johns Manville; a Berkshire Hathaway company.
4. Or approved equal.

B. Performance Criteria:

1. Sustainability Characteristics:

a. Sealant must have a VOC content of g/L or less.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF SLEEVES FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Sleeves for Conduits Penetrating Above-Grade, Non-Fire-Rated, Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
b. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4 inch annular clear space between sleeve and raceway or cable, unless sleeve-seal system is to be installed or seismic criteria require different clearance.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inch above finished floor level. Install sleeves during erection of floors.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Wall Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for wall assemblies.

C. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve-seal systems. Size sleeves to allow for 1 inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

E. Underground, Exterior-Wall and Floor Penetrations:

1. Install steel pipe sleeves with integral waterstops. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system. Install sleeve during construction of floor or wall.
2. Install steel pipe sleeves. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system. Grout sleeve into wall or floor opening.

3.3 INSTALLATION OF RECTANGULAR SLEEVES AND SLEEVE SEALS

A. Install sleeves in existing walls without compromising structural integrity of walls. Do not cut structural elements without reinforcing the wall to maintain the designed weight bearing and wall stiffness.

B. Install conduits and cable with no crossings within the sleeve.

C. Fill opening around conduits and cables with expanding foam without leaving voids.

D. Provide metal sheet covering at both wall surfaces and finish to match surrounding surfaces. Metal sheet must be same material as sleeve.

3.4 INSTALLATION OF SLEEVE-SEAL SYSTEMS

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION 260544

SECTION 260548 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.3 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage qualified structural professional engineer licensed in the State of New York to design seismic and wind-load control system in accordance with criteria specified in Section 260010 "Supplemental Requirements for Electrical" and Section 260011 "Facility Performance Requirements for Electrical."

B. Seismic- and Wind-Load-Restraint Device Load Ratings: Devices to be tested and rated in accordance with NYC Building Code. Devices to be listed by a nationally recognized third party that requires periodic follow-up inspections and has a listing directory available to the public.

C. Consequential Damage: Provide additional seismic and wind-load restraints for suspended components or anchorage of floor-, roof-, or wall-mounted components so that failure of a non-essential or essential component will not cause failure of any other essential building component.

D. Fire/Smoke Resistance: Seismic- and wind-load-restraint devices that are not constructed of ferrous metals must have a maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by qualified testing laboratory in accordance with ASTM E84 or UL 723, and be so labeled.

E. Component Supports:

1. Load ratings, features, and applications of reinforcement components must be based on testing standards of qualified testing laboratory.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and equipment to receive seismic and wind-load control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an evaluation service member of ICC-ES.

B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry static, wind-load, and seismic loads within specified loading limits.

3.4 INSTALLATION OF SEISMIC-RESTRAINT AND WIND-LOAD CONTROL DEVICES

A. Provide seismic restraint and wind-load control devices for systems and equipment where indicated in Equipment Schedules or Seismic and Wind-Load Controls Schedule, where indicated on Drawings, where the Specifications indicate they are to be installed on specific equipment and systems, and where required by applicable codes.

1. Install equipment and devices to withstand the effects of earthquake motions and high wind events.

B. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

C. Installation of seismic and wind-load restraints must not cause any stresses, misalignment, or change of position of equipment or conduits.

D. Equipment Restraints:

1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.

2. Install seismic-restraint and wind-load-restraint devices using methods approved by an evaluation service member of ICC-ES that provides required submittals for component.

E. Raceway, Cable, Wireway, Cable Tray, and Busway Support and Hanger Restraints:

1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
2. Install seismic-restraint and wind-load-restraint devices using methods approved by an evaluation service member of ICC-ES that provides required submittals for component.
3. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
4. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES providing required submittals for component.

F. Install cables so they do not bend across edges of adjacent equipment or building structure.

G. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

H. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

3.5 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where connection is terminated to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

END OF SECTION 260548

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1.

B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:

1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.
2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

C. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

D. Comply with NFPA 70EandSection 260573.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 1000 V or Less:

1. Black letters on orange field.
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded service conductors.

1. Color must be factory applied or field applied for sizes larger than 8 AWG.
2. Colors for 208Y/120 V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.

3. Colors for 240 V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.

4. Colors for 480Y/277 V Circuits:

    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

5. Color for Neutral: White or gray.
6. Color for Equipment Grounds: Bare copper or Green or Green with yellow stripe.
7. Colors for Isolated Grounds: Green with two or more yellow stripes.

C. Warning Label Colors:

1. Identify system voltage with black letters on orange background.

D. Warning labels and signs must include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."

E. Equipment Identification Labels:

1. Black letters on white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Brady Corporation.
    b. Champion America.
    c. Emedco.
    d. Grafoplast Wire Markers.
    e. HellermannTyton.
    f. LEM Products Inc.
    g. Marking Services, Inc.
    h. Panduit Corp.
    i. Seton Identification Products; a Brady Corporation company.
    j. Or approved equal.

B. Self-Adhesive Wraparound Labels: Preprinted, 3 mil thick, polyestervinyl flexible label with acrylic pressure-sensitive adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. A'n D Cable Products.
    b. Brady Corporation.
    c. Brother International Corporation.
    d. Emedco.
    e. Grafoplast Wire Markers.
    f. Ideal Industries, Inc.
    g. LEM Products Inc.
    h. Marking Services, Inc.
    i. Panduit Corp.
    j. Seton Identification Products; a Brady Corporation company.
    k. Or approved equal.

2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over legend. Labels sized such that clear shield overlaps entire printed legend.
3. Marker for Labels:

    a. Permanent, waterproof, black ink marker recommended by tag manufacturer.

C. Self-Adhesive Labels: PolyesterVinyl, thermal, transfer-printed, 3 mil thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. A'n D Cable Products.
    b. Brady Corporation.
    c. Brother International Corporation.
    d. Emedco.
    e. Grafoplast Wire Markers.
    f. HellermannTyton.
    g. Ideal Industries, Inc.
    h. LEM Products Inc.

i. Marking Services, Inc.
j. Panduit Corp.
k. Seton Identification Products; a Brady Corporation company.
l. Or approved equal.

2. Minimum Nominal Size:

a. 1-1/2 by 6 inch for raceway and conductors.
b. 3-1/2 by 5 inch for equipment.
c. As required by New York City Electrical Coden.

2.4 BANDS AND TUBES

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inch long, with diameters sized to suit diameters and that stay in place by gripping action.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. HellermannTyton.
c. Marking Services, Inc.
d. Panduit Corp.
e. Or approved equal.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at maximum of 200 deg F. Comply with UL 224.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Panduit Corp.
b. Brady Corporation.
c. HellermannTyton.
d. Or approved equal.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Champion America.
c. HellermannTyton.
d. Ideal Industries, Inc.
e. Marking Services, Inc.
f. Panduit Corp.
g. Or approved equal.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mil thick by 1 to 2 inch wide; compounded for outdoor use.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Carlton Industries, LP.
c. emedco.
d. Marking Services, Inc.
e. Or approved equal.

C. Tape and Stencil: 4 inch wide black stripes on 10 inch centers placed diagonally over orange background and are 12 inch wide. Stop stripes at legends.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brimar Industries, Inc.
b. HellermannTyton.
c. LEM Products Inc.
d. Marking Services, Inc.
e. Seton Identification Products; a Brady Corporation company.
f. Or approved equal.

D. Floor Marking Tape: 2 inch wide, 5 mil pressure-sensitive vinyl tape, with black and whiteyellow and black stripes and clear vinyl overlay.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Seton Identification Products; a Brady Corporation company.
c. Brimar Industries, Inc.
d. Or approved equal.

E. Underground-Line Warning Tape:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Brimar Industries, Inc.
c. Ideal Industries, Inc.
d. LEM Products Inc.
e. Marking Services, Inc.
f. Reef Industries, Inc.
g. Seton Identification Products; a Brady Corporation company.
h. Or approved equal.

2. Tape:

a. Recommended by manufacturer for method of installation and suitable to identify and locate underground electrical utility lines.
b. Printing on tape must be permanent and may not be damaged by burial operations.
c. Tape material and ink must be chemically inert and not be subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

3. Color and Printing:

a. Comply with APWA Uniform Color Code using NEMA Z535.1 safety colors.
b. Inscriptions for Red Tapes: "CAUTION BURIED ELECTRIC LINE BELOW".
c. Inscriptions for Orange Tapes: "CAUTION BURIED CATV LINE BELOW""CAUTION BURIED TELEPHONE LINE BELOW""CAUTION BURIED FIBER OPTIC LINE BELOW""CAUTION BURIED COMMUNICATION LINE BELOW".

4. Type I Tape:

a. Pigmented polyolefin, bright colored, continuous-printed on one side with inscription of utility, compounded for direct-burial service.
b. Width: 3 inch.
c. Thickness: 4 mil.
d. Weight: 18.5 lb/1000 sq. ft.
e. Tensile in accordance with ASTM D882: 30 lbf and 2500 psi.

5. Type II Tape:

a. Multilayer laminate, consisting of high-density polyethylene scrim coated with pigmented polyolefin; bright colored, continuous-printed on one side with inscription of utility, compounded for direct-burial service.
b. Width: 3 inch.
c. Thickness: 12 mil.
d. Weight: 36.1 lb/1000 sq. ft.
e. Tensile in accordance with ASTM D882: 400 lbf and 11,500 psi.

F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height must be 1 inch.

2.6 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Carlton Industries, LP.
c. emedco.
d. Marking Services, Inc.
e. Seton Identification Products; a Brady Corporation company.
f. Or approved equal.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Carlton Industries, LP.
c. emedco.
d. Grafoplast Wire Markers.
e. LEM Products Inc.
f. Marking Services, Inc.
g. Panduit Corp.
h. Seton Identification Products; a Brady Corporation company.
i. Or approved equal.

2.7 SIGNS

A. Baked-Enamel Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Champion America.
c. emedco.
d. Marking Services, Inc.
e. Or approved equal.

2. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
3. 1/4 inch grommets in corners for mounting.
4. Nominal Size: 7 by 10 inch.

B. Metal-Backed Butyrate Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Champion America.
c. emedco.
d. Marking Services, Inc.
e. Or approved equal.

2. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396 inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
3. 1/4 inch grommets in corners for mounting.
4. Nominal Size: 10 by 14 inch.

C. Laminated Acrylic or Melamine Plastic Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brady Corporation.
   b. Carlton Industries, LP.
   c. emedco.
   d. Marking Services, Inc.
   e. Or approved equal.

2. Engraved legend.
3. Thickness:

   a. For signs up to 20 sq. inch, minimum 1/16 inch thick.
   b. For signs larger than 20 sq. inch, 1/8 inch thick.
   c. Engraved legend with black letters on white facewhite letters on dark gray background.
   d. Punched or drilled for mechanical fasteners with 1/4 inch grommets in corners for mountingSelf-adhesive.
   e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. HellermannTyton.
2. Ideal Industries, Inc.
3. Marking Services, Inc.
4. Panduit Corp.
5. Or approved equal.

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F in accordance with ASTM D638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.3 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

I. Emergency Operating Instruction Signs: Install instruction signs with white legend on red background with minimum 3/8 inch high letters for emergency instructions at equipment used for power transfer.

J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.

K. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:

1. "EMERGENCY POWER."
2. "POWER."

L. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.

M. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.

N. Self-Adhesive Labels:

1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inch high.

O. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.

P. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.

Q. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.

R. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

S. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

T. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.

U. Metal Tags:

1. Place in location with high visibility and accessibility.
2. Secure using general-purposeUV-stabilized plenum-rated cable ties.

V. Nonmetallic Preprinted Tags:

1. Place in location with high visibility and accessibility.
2. Secure using general-purpose UV-stabilized plenum-rated cable ties.

W. Write-on Tags:

1. Place in location with high visibility and accessibility.
2. Secure using general-purpose UV-stabilized plenum-rated cable ties.

X. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on minimum 1-1/2 inch high sign; where two lines of text are required, use signs minimum 2 inch high.

Y. Metal-Backed Butyrate Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.

Z. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.

AA. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.4 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify cover of junction and pull box of the following systems with self-adhesive labels containing wiring system legend and system voltage. System legends must be as follows:

1. "EMERGENCY POWER."
2. "POWER."

E. Power-Circuit Conductor Identification, 1000 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with conductor designation.

H. Conductors to Be Extended in Future: Attach marker tape to conductors and list source.

I. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

J. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

K. Workspace Indication: Apply floor marking tapeortape and stencil to finished surfaces. Show working clearances in direction of access to live parts. Workspace must comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

L. Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.

M. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labelsBaked-enamel warning signs.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

a. Power-transfer switches.
b. Controls with external control power connections.

N. Arc Flash Warning Labeling: Self-adhesive labels.

O. Operating Instruction Signs: Self-adhesive labels Baked-enamel warning signs.

P. Emergency Operating Instruction Signs: Self-adhesive labels Baked-enamel warning signs with white legend on red background with minimum 3/8 inch high letters for emergency instructions at equipment used for power transfer.

Q. Equipment Identification Labels:

1. Indoor Equipment: Self-adhesive label Baked-enamel signs.
2. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of self-adhesive, engraved, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchboards.
    e. Emergency system boxes and enclosures.
    f. Enclosed switches.
    g. Enclosed circuit breakers.
    h. Enclosed controllers.
    i. Variable-speed controllers.
    j. Push-button stations.
    k. Power-transfer equipment.
    l. Contactors.
    m. Remote-controlled switches, dimmer modules, and control devices.
    n. Battery-inverter units.
    o. Power-generating units.
    p. Monitoring and control equipment.

END OF SECTION 260553

SECTION 260573.13 - SHORT-CIRCUIT STUDIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Computer-based, fault-current study to determine minimum interrupting capacity of circuit protective devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260573.16 "Coordination Studies" for overcurrent protective device coordination studies.
4. Section 260573.19 "Arc-Flash Hazard Analysis" for arc-flash studies.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled. Existing to remain items must remain functional throughout construction period.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

F. Single-Line Diagram: See "One-Line Diagram."

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For power system analysis software to be used for studies.

B. Short-Circuit Study Report:

1. Submit the following after approval of system protective devices submittals. Submittals must be in digital form.

a. Short-circuit study input data, including completed computer program input data sheets.
b. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Commissioner for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
c. Revised one-line diagram, reflecting field investigation results and results of short-circuit study.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Study must be performed using commercially developed and distributed software designed specifically for power system analysis.

C. Software algorithms must comply with requirements of standards and guides specified in this Section.

D. Manual calculations are unacceptable.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE

A. Product: Subject to compliance with requirements, provide one of the following:

1. CGI CYME.
2. EasyPower, LLC (formerly ESA Inc.).

3. EDSA Micro Corporation.
4. ESA Inc.
5. Operation Technology, Inc.
6. Power Analytics, Corporation.
7. SKM Systems Analysis, Inc.
8. Or approved equal.

B. Comply with IEEE 399 and IEEE 551.

C. Analytical features of power systems analysis software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program must be capable of plotting and diagramming time-current-characteristic curves as part of its output.

E. Computer program must be designed to perform short-circuit studies or have function, component, or add-on module designed to perform short-circuit studies.

F. Computer program must be developed under supervision of licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram of modeled power system, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations and ratings.
6. Derating factors and environmental conditions.
7. Any revisions to electrical equipment required by study.

D. Comments and recommendations for system improvements or revisions in written document, separate from one-line diagram.

E. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to available short-circuit currents. Verify that equipment withstand ratings exceed available short-circuit current at equipment installation locations.
2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.

3. For 600 V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in standards to 1/2-cycle symmetrical fault current.
5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data:

1. One-line diagram of system being studied.
2. Power sources available.
3. Manufacturer, model, and interrupting rating of protective devices.
4. Conductors.
5. Transformer data.

G. Short-Circuit Study Output Reports:

1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. Equivalent impedance.

2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated symmetrical fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. Calculated asymmetrical fault currents:

        1) Based on fault-point X/R ratio.
        2) Based on calculated symmetrical value multiplied by 1.6.
        3) Based on calculated symmetrical value multiplied by 2.7.

3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

    a. Voltage.
    b. Calculated symmetrical fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. No AC Decrement (NACD) ratio.
    e. Equivalent impedance.
    f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
    g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 POWER SYSTEM DATA

A. Obtain data necessary for conduct of study.

1. Verify completeness of data supplied on one-line diagram. Call discrepancies to Commissioner's attention.
2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.

B. Gather and tabulate required input data to support short-circuit study. Record data on Record Document copy of one-line diagram. Comply with recommendations in IEEE 551 as to amount of detail that is required to be acquired in field. Field data gathering must be by, or under supervision of, qualified electrical professional engineer licensed in the State of New York. Data include, but are not limited to, the following:

1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at service.
3. Power sources and ties.
4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
5. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
6. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
7. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
8. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
9. Motor horsepower and NEMA MG 1 code letter designation.
10. Conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
11. Derating factors.

3.3 SHORT-CIRCUIT STUDY

A. Perform study following general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on device characteristics supplied by device manufacturer.

D. Extent of electrical power system to be studied is indicated on Drawings.

E. Begin short-circuit current analysis at service, extending down to system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 5 kA or less.
2. Exclude equipment supplied by single transformer smaller than 75 kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. Include ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for fault-current dc decrement to address asymmetrical requirements of interrupting equipment.

H. Calculate short-circuit momentary and interrupting duties for three-phase bolted fault and single line-to-ground fault at each equipment indicated on one-line diagram.

1. For grounded systems, provide bolted line-to-ground fault-current study for areas as defined for three-phase bolted fault short-circuit study.

I. Include in report identification of protective device applied outside its capacity.

END OF SECTION 260573.13

SECTION 260573.16 - COORDINATION STUDIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.

    a. Study results must be used to determine coordination of series-rated devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260573.13 "Short-Circuit Studies" for fault-current studies.
4. Section 260573.19 "Arc-Flash Hazard Analysis" for arc-flash studies.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled. Existing to remain items must remain functional throughout construction period.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when abnormal current flow exists and then removes the affected portion of the circuit from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

F. Single-Line Diagram: See "One-Line Diagram."

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For power system analysis software to be used for studies.

B. Coordination Study Report:

1. Submit the following after approval of system protective devices submittals. Submittals must be in digital form.

a. Coordination-study input data, including completed computer program input data sheets.
b. Study and equipment evaluation reports.
c. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Commissioner for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
d. Revised one-line diagram, reflecting field investigation results and results of coordination study.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For overcurrent protective device coordination study software, certifying compliance with IEEE 399.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Studies must be performed using commercially developed and distributed software designed specifically for power system analysis.

C. Software algorithms must comply with requirements of standards and guides specified in this Section.

D. Manual calculations are unacceptable.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE

A. Product: Subject to compliance with requirements, provide one of the following:

1. CGI CYME.
2. EasyPower, LLC (formerly ESA Inc.).
3. EDSA Micro Corporation.
4. ESA Inc.
5. Operation Technology, Inc.
6. Power Analytics, Corporation.
7. SKM Systems Analysis, Inc.
8. Or approved equal.

B. Comply with IEEE 242 and IEEE 399.

C. Analytical features of device coordination study computer software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program must be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program must report device settings and ratings of overcurrent protective devices and must demonstrate selective coordination by computer-generated, time-current coordination plots.

1. Optional Features:

a. Arcing faults.
b. Simultaneous faults.
c. Explicit negative sequence.
d. Mutual coupling in zero sequence.

E. Computer program must be designed to perform coordination studies or have function, component, or add-on module designed to perform coordination studies.

F. Computer program must be developed under supervision of licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 COORDINATION STUDY REPORT CONTENTS

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram of modeled power system, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations.
6. Revisions to electrical equipment required by study.
7. Study Input Data: As described in "Power System Data" Article.

    a. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."

D. Protective Device Coordination Study:

1. Report recommended settings of protective devices, ready to be applied in field. Use manufacturer's data sheets for recording recommended setting of overcurrent protective devices when available.

    a. Phase and Ground Relays:

        1) Device tag.
        2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
        3) Recommendations on improved relaying systems, if applicable.

    b. Circuit Breakers:

        1) Adjustable pickups and time delays (long time, short time, and ground).
        2) Adjustable time-current characteristic.
        3) Adjustable instantaneous pickup.
        4) Recommendations on improved trip systems, if applicable.

    c. Fuses: Show current rating, voltage, and class.

E. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for switching schemes and for emergency periods where power source is local generation. Show the following information:

1. Device tag and title, one-line diagram with legend identifying portion of system covered.
2. Terminate device characteristic curves at point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.
3. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
4. Plot the following listed characteristic curves, as applicable:

    a. Power utility's overcurrent protective device.
    b. Medium-voltage equipment overcurrent relays.
    c. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
    d. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.

e. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
f. Cables and conductors damage curves.
g. Ground-fault protective devices.
h. Motor-starting characteristics and motor damage points.
i. Generator short-circuit decrement curve and generator damage point.
j. Largest feeder circuit breaker in each motor-control center and panelboard.

5. Maintain selectivity for tripping currents caused by overloads.
6. Maintain maximum achievable selectivity for tripping currents caused by overloads on series-rated devices.
7. Provide adequate time margins between device characteristics such that selective operation is achieved.
8. Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance of the Work. Devices to be coordinated are indicated on Drawings.

1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.3 POWER SYSTEM DATA

A. Obtain data necessary for conduct of overcurrent protective device study.

1. Verify completeness of data supplied in one-line diagram on Drawings. Call discrepancies to Commissioner's attention.
2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
3. For equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and New York State licensed engineers. Qualifications of technicians and engineers licensed in the State of New York must be in accordance with NFPA 70E.

B. Gather and tabulate required input data to support coordination study. List below is guide. Comply with recommendations in IEEE 551 for amount of detail required to be acquired in field. Field data gathering must be by, or under supervision of, qualified electrical professional engineer licensed in the State of New York. Data include, but are not limited to, the following:

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Electrical power utility impedance at service.
3. Power sources and ties.
4. Short-circuit current at each system bus (three phase and line to ground).
5. Full-load current of loads.
6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
8. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
12. Maximum demands from service meters.
13. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
14. Motor horsepower and NEMA MG 1 code letter designation.
15. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
16. Medium-voltage cable sizes, lengths, conductor material, cable construction, metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).
17. Data sheets to supplement electrical distribution system one-line diagram, cross-referenced with tag numbers on diagram, showing the following:

    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Generator thermal-damage curve.
    e. Ratings, types, and settings of utility company's overcurrent protective devices.
    f. Special overcurrent protective device settings or types stipulated by utility company.
    g. Time-current-characteristic curves of devices indicated to be coordinated.
    h. Manufacturer, frame size, interrupting rating in amperes root mean square (rms) symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.

i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
j. Switchgear, switchboards, motor-control centers, and panelboards ampacity, and SCCR in amperes rms symmetrical.
k. Identify series-rated interrupting devices for condition where available fault current is greater than interrupting rating of downstream equipment. Obtain device data details to allow verification that series application of these devices complies with NFPA 70 and UL 489 requirements.

3.4 COORDINATION STUDY

A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.

B. Comply with IEEE 399 for general study procedures.

C. Base study on device characteristics supplied by device manufacturer.

D. Extent of electrical power system to be studied is indicated on Drawings.

E. Begin analysis at service, extending down to system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 5 kA or less.
2. Exclude equipment supplied by single transformer smaller than 75kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. Transformer Primary Overcurrent Protective Devices:

1. Device must not operate in response to the following:

a. Inrush current when first energized.
b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device settings must protect transformers according to IEEE C57.12.00, for fault currents.

H. Motor Protection:

1. Select protection for low-voltage motors according to IEEE 242 and NFPA 70.
2. Select protection for motors served at voltages more than 600 V according to IEEE 620.

I. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands maximum short-circuit current for time equivalent to tripping time of primary relay protection or total clearing time of fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

J. Generator Protection: Select protection according to manufacturer's instructions and to IEEE 242.

K. Include ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for fault-current dc decrement, to address asymmetrical requirements of interrupting equipment.

L. Calculate short-circuit momentary and interrupting duties for three-phase bolted fault and single line-to-ground fault at each equipment indicated on one-line diagram.

1. For grounded systems, provide bolted line-to-ground fault-current study for areas as defined for three-phase bolted fault short-circuit study.

M. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short-circuit ratings.
2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.
3. Application of series-rated devices must be recertified, complying with requirements in NFPA 70.
4. Include in report identification of protective device applied outside its capacity.

3.5 LOAD-FLOW AND VOLTAGE-DROP STUDY

A. Perform load-flow and voltage-drop study to determine steady-state loading profile of system. Analyze power system performance two times as follows:

1. Determine load flow and voltage drop based on full-load currents obtained in "Power System Data" Article.
2. Determine load flow and voltage drop based on 80 percent of design capacity of load buses.
3. Prepare load-flow and voltage-drop analysis and report to show power system components that are overloaded, or might become overloaded; show bus voltages that are less than as prescribed by NFPA 70.

3.6 MOTOR-STARTING STUDY

A. Perform motor-starting study to analyze transient effect of system's voltage profile during motor starting. Calculate significant motor-starting voltage profiles and analyze effects of motor starting on power system stability.

B. Prepare motor-starting study report, noting light flicker for limits proposed by IEEE 141, and voltage sags so as not to affect operation of other utilization equipment on system supplying motor.

3.7 FIELD ADJUSTING

A. Adjust relay and protective device settings according to recommended settings provided by coordination study. Field adjustments must be completed by engineering service division of equipment manufacturer under "Startup and Acceptance Testing" contract portion.

B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.

C. Testing and adjusting must be by qualified low-voltage electrical testing and inspecting agency.

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters. Perform NETA tests and inspections for adjustable overcurrent protective devices.

END OF SECTION 260573.16

SECTION 260573.19 - ARC-FLASH HAZARD ANALYSIS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Computer-based, arc-flash study to determine arc-flash hazard distance and incident energy to which personnel could be exposed during work on or near electrical equipment.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260573.13 "Short-Circuit Studies" for fault-current studies.
4. Section 260573.16 "Coordination Studies" for overcurrent protective device coordination studies.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. p.u.: Per unit. The reference unit, established as a calculating convenience, for expressing all power system electrical parameters on a common reference base.

E. SCCR: Short-circuit current rating.

F. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

G. Single-Line Diagram: See "One-Line Diagram."

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For power system analysis software to be used for studies.

B. Study Submittals:

1. Submit the following after approval of system protective devices submittals. Submittals must be in digital form:

a. Arc-flash study input data, including completed computer program input data sheets.
b. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Commissioner for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
c. Revised one-line diagram, reflecting field investigation results and results of arc-flash study.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Study must be performed using commercially developed and distributed software designed specifically for power system analysis.

C. Software algorithms must comply with requirements of standards and guides specified in this Section.

D. Manual calculations are unacceptable.

1.8 REGULATORY AGENCY APPROVALS

A. Submittals for arc-flash hazard analysis requiring approval by the Commisioner must be signed and sealed by qualified electrical professional engineer licensed in the State of New York responsible for their preparation.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CGI CYME.
2. EasyPower, LLC (formerly ESA Inc.).
3. EDSA Micro Corporation.
4. ESA Inc.
5. Operation Technology, Inc.
6. Power Analytics, Corporation.
7. SKM Systems Analysis, Inc.
8. Or approved equal.

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer program must be designed to perform arc-flash analysis or have function, component, or add-on module designed to perform arc-flash analysis.

E. Computer program must be developed under supervision of New York State licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 ARC-FLASH STUDY REPORT CONTENT

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings, including derating factors and environmental conditions.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, panelboard designations, and ratings.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output Data: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."

F. Protective Device Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 260573.16 "Coordination Studies."

G. Arc-Flash Study Output Reports:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each equipment location included in report:

    a. Voltage.
    b. Calculated symmetrical fault-current magnitude and angle.
    c. Fault-point X/R ratio.
    d. No AC Decrement (NACD) ratio.
    e. Equivalent impedance.
    f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
    g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.

H. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Restricted approach boundary.
6. Limited approach boundary.
7. Working distance.
8. Incident energy.
9. Hazard risk category.
10. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including definition of terms and guide for interpretation of computer printout.

2.3 ARC-FLASH WARNING LABELS

A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce 3.5 by 5 inch self-adhesive equipment label for each work location included in analysis.

B. Label must have orange header with wording, "WARNING, ARC-FLASH HAZARD," and must include the following information taken directly from arc-flash hazard analysis:

1. Location designation.
2. Nominal voltage.
3. Protection boundaries.

    a. Arc-flash boundary.
    b. Restricted approach boundary.
    c. Limited approach boundary.

4. Arc flash PPE category.
5. Required minimum arc rating of PPE in Cal/cm squared.
6. Available incident energy.
7. Working distance.
8. Engineering report number, revision number, and issue date.

C. Labels must be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.3 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Preparatory Studies: Perform Short-CircuitandProtective Device Coordinationstudies prior to starting Arc-Flash Hazard Analysis.

1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."
2. Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 260573.16 "Coordination Studies."

C. Calculate maximum and minimum contributions of fault-current size.

1. Maximum calculation must assume maximum contribution from utility and must assume motors to be operating under full-load conditions.
2. Calculate arc-flash energy at 85 percent of maximum short-circuit current in accordance with IEEE 1584 recommendations.
3. Calculate arc-flash energy at 38 percent of maximum short-circuit current in accordance with NFPA 70E recommendations.
4. Calculate arc-flash energy with utility contribution at minimum and assume no motor contribution.

D. Calculate arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.

E. Include medium- and low-voltage equipment locations, except equipment fed from transformers smaller than 75 kVA.

F. Calculate limited, restricted, and prohibited approach boundaries for each location.

G. Incident energy calculations must consider accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations must take into account changing current contributions, as sources are interrupted or decremented with time. Fault contribution from motors and generators must be decremented as follows:

1. Fault contribution from induction motors must not be considered beyond three to five cycles.
2. Fault contribution from synchronous motors and generators must be decayed to match actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 p.u. to 3 p.u. after 10 cycles).

H. Arc-flash energy must generally be reported for maximum of line or load side of circuit breaker. However, arc-flash computation must be performed and reported for both line and load side of circuit breaker as follows:

1. When circuit breaker is in separate enclosure.
2. When line terminals of circuit breaker are separate from work location.

I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.4 POWER SYSTEM DATA

A. Obtain data necessary for conduct of arc-flash hazard analysis.

1. Verify completeness of data supplied on one-line diagram on Drawings. Call discrepancies to Commissioner's attention.
2. For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.
3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys conducted by qualified technicians and New York State licensed engineers.

B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to amount of detail that is required to be acquired in field. Field data gathering must be under direct supervision and control of engineer in charge of performing study, and must be by, or under supervision of, a New York State licensed qualified electrical professional engineer. Data include, but are not limited to, the following:

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance or available short circuit current at service.

3. Power sources and ties.
4. Short-circuit current at each system bus (three phase and line to ground).
5. Full-load current of loads.
6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
8. For reactors, provide manufacturer and model designation, voltage rating and impedance.
9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
12. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
13. Motor horsepower and NEMA MG 1 code letter designation.
14. Low-voltage conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
15. Medium-voltage conductor sizes, lengths, conductor material, conductor construction and metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).

3.5 LABELING

A. Apply one arc-flash label on front cover of each section of equipmentand on side or rear covers with accessible live parts and hinged doors or removable plates for each equipment included in study. Base arc-flash label data on highest values calculated at each location.

B. Each piece of equipment listed below must have arc-flash label applied to it:

1. Switchboards.
2. Panelboards.
3. Motor-control centers.
4. Low voltage transformers.
5. Safety switches.
6. Control panels.

C. Note on record Drawings location of equipment where personnel could be exposed to arc-flash hazard during their work.

1. Indicate arc-flash energy.
2. Indicate protection level required.

3.6 APPLICATION OF WARNING LABELS

A. Install arc-flash warning labels under direct supervision and control of qualified electrical professional engineer licensed in the State of New York.

END OF SECTION 260573.19

SECTION 260800 - COMMISSIONING OF ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the project: (1) the contract drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the contract [City of New York Standard Construction Contract.]

1.2 SUMMARY

A. This section includes commissioning process requirements for Electrical systems, assemblies, and equipment.

B. Related Requirements:

1. Refer to DDC General Conditions for commissioning process requirements.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

B. In addition, provide the following:

1. Certificates of readiness
2. Certificates of completion of installation, prestart, and startup activities.
3. O&M manuals
4. Field / factory Test reports

1.4 DESCRIPTION

A. Commissioning: Commissioning is a systematic process of ensuring that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the City of New York with an unbiased, objective view of the system's installation, operation and performance. This process does not eliminate or reduce the responsibility of contractor to provide a complete design or finished product. Commissioning is intended to enhance the quality of each system installation, startup and transfer to beneficial use by the City of New York.

B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout.
2. Verify and document proper performance of equipment and systems.
3. Verify that Operation & Maintenance documentation is complete and transferred to City of New York.
4. Verify that proper orientation program has been implemented for the City of New York's operating personnel.
5. Ensure that provisions are in place for a post occupancy review with O&M staff within 10 months after Substantial Completion.

C. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, balancing and verification and performance checkouts.

D. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Commissioner, Contractor, subcontractors, manufacturers and equipment suppliers.

E. The Cx process shall not reduce the responsibility of the Contractor to comply with the Contract Documents.

1.5 DEFINITIONS

A. Refer to DDC General Conditions for definitions.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Test Equipment Calibration Requirements: contractors will comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

A. Refer to DDC General Conditions pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the Contractor shall ultimately be responsible for all standard testing equipment for the electrical systems and control systems in Division 26. A sufficient quantity of two-way radios shall be provided by the contractor.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the City of New York and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the City of New York upon completion of the commissioning process.

D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

B. Coordinate with the CxA in preparing Installation Check Sheets for all commissioned components, equipment, and systems

C. Red-lined Drawings:

1. Verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
2. Preliminary, red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
4. Create the as-built drawings.

D. Operation and Maintenance Data:

1. Provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
2. The CxA will review the O&M literature once for conformance to project requirements.

3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the contractor.

E. Demonstration and Instruction:

1. Provide demonstration and operator's instruction as required by the contract document.
2. A complete instruction plan, and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any such event.
3. Agenda for each instruction session shall be submitted to the CxA at least one (1) week prior to the session.
4. The CxA shall be notified at least seventy-two (72) hours in advance of scheduled tests so that testing may be observed by the CxA. A copy of the test record shall be provided to the CxA.
5. Engage a Factory-authorized service representative to demonstrate City of New York's maintenance personnel to adjust, operate, and maintain specific equipment.
6. Instruct City of New York's service personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining equipment.
7. Review and update data in O&M Manuals.

3.2 CONTRACTOR'S RESPONSIBILITIES FOR SUBCONTRACTOR PERFORMANCE

A. The Contractor shall have the following instruction responsibilities

B. Perform commissioning tests as per the written procedures and at the direction of the CxA

C. Attend construction phase controls coordination meetings.

D. Participate in Electrical systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Include requirements for submittal data, operation and maintenance data, and instruction in each purchase order or sub-contract written.

G. Prepare preliminary schedule for Electrical system orientations and inspections, operation and maintenance manual submissions, instruction sessions, equipment start-up and task completion for the City of New York. Distribute preliminary schedule to commissioning team members.

H. Update schedule as required throughout the construction period.

I. During the startup and initial checkout process, execute the related portions of the prefunctional checklists for all commissioned equipment.

J. Perform all verification and functional performance tests in the presence of the CxA as required.

K. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

L. Gather operation and maintenance literature on all equipment and assemble in binders as required by the specifications. Submit to CxA forty-five (45) days after submittal acceptance.

M. Coordinate with the CxA to provide seventy-two (72) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.

N. Notify the CxA a minimum of two weeks in advance for start of the testing work.

O. Participate in, and schedule vendors and respective subcontractors to participate in the operator's orientation sessions.

P. Provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.

Q. Attend the 10-month warranty walkthrough with the Commissioner and the CxA.

R. Electrical equipment including switchgear, panel boards, motor control centers, lighting, receptacles, and all other equipment furnished under this Division.

1. Fire alarm system
2. Lighting System

S. The equipment supplier shall document the performance of the equipment.

T. Equipment Suppliers

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the City of New York, to keep warranties in force.
2. Assist in equipment testing.
3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

U. Refer to DDC General Conditions for additional responsibilities.

3.3 TESTING PREPARATION

A. Certify in writing to the CxA that Electrical systems, subsystems, and equipment have been installed, megerred, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that Electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify in writing that testing procedures have been completed and that testing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.4 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of Electrical testing shall include the entire Electrical installation, from the incoming power equipment throughout the distribution system. Testing shall include measuring, but not limited to resistance, voltage, and amperage of system(s) and devices.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. Prepare detailed testing plans, procedures, and checklists for Electrical systems, subsystems, and equipment with guidance from CxA.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. If tests cannot be completed because of a deficiency outside the scope of the Electrical system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

I. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.5 ELECTRICAL SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in Division 26. Provide submittals, test data, inspector record, infrared camera and certifications to the CxA.

B. Electrical Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 26. Assist the CxA with preparation of testing plans.

C. Fire Detection and Alarm System Testing: Provide technicians, instrumentation, tools and equipment to test performance of designated systems and devices at the direction of the CxA.

D. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. Electrical Distribution System Testing: Provide technicians, load banks, infrared cameras, instrumentation, tools and equipment to test performance of designated systems and devices at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested

F. Variable Frequency Drive System Testing: Prepare a variable frequency drive system testing plan to include tuning to minimize vibration. Coordinate witnessing of testing with CxA.

G. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

H. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The scope of commissioning work shall include but not limited to the following equipment and systems:

1. Electrical Main Switchboards and Transformers
2. Electrical Distribution system and panels.
3. Lighting and Lighting Controls
4. Fire Alarm Systems

3.6 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT

A. Refer to DDC General Conditions for requirements pertaining to deficiencies and nonconformance, requirements for retesting, or failure due to manufacturer defect.

3.7 APPROVAL

A. Refer to DDC General Conditions pertaining to approval procedures.

3.8 SEASONAL TESTING

A. Refer to DDC General Conditions pertaining to seasonal testing.

3.9 OPERATION AND MAINTENANCE MANUALS

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements.

B. Refer the DDC General Conditions for the Commissioner and CxA roles in the Operation and Maintenance Manual contribution, review, and approval process.

3.10 INSTRUCTION OF FACILTY PERSONNEL

A. Contractor. The Contractor shall have the following instruction responsibilities:

1. Provide the CxA with an instruction plan four weeks before the planned instruction.
2. Provide the facility operating personnel with comprehensive instruction in the understanding of the systems and the operation and maintenance of each major piece of commissioned electrical equipment or system.
3. Instruction shall be recorded by the CxA and start with classroom sessions, if necessary, followed by hands on instruction on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary, and the demonstration repeated.
5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the instruction.
6. The instruction sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
7. Instruction shall include:

    a. Use the printed installation, operation and maintenance instruction material included in the O&M manuals.
    b. Include a review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The instruction shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
    c. Discuss relevant health and safety issues and concerns.
    d. Discuss warranties and guarantees.
    e. Cover common troubleshooting problems and solutions.
    f. Explain information included in the O&M manuals and the location of all plans and manuals in the facility.
    g. Discuss any peculiarities of equipment installation or operation.

8. Hands-on instruction shall include start-up, operation in all modes possible, including manual, shutdown and any emergency procedures and preventative maintenance of all pieces of equipment.
9. Fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
10. Instruction shall occur after functional testing is complete, unless approved otherwise by the Commissioner.

END OF SECTION 260800

SECTION 260913 - ELECTRICAL POWER MONITORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Multifunction energy meters.
2. Power meters.
3. Power monitoring and control software.
4. Network configuration software.
5. System operator interfaces.
6. Raceways and boxes.
7. Wires and cables.
8. Surge protection devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 262713 "Electricity Metering" for equipment to meter electricity consumption and demand for tenant submetering.

1.3 DEFINITIONS

A. Active Power: The average power consumed by a unit. Also known as "real power."

B. Analog: A continuously varying signal value, such as current, flow, pressure, or temperature.

C. Apparent (Phasor) Power: "S = VI" where "S" is the apparent power, "V" is the RMS value of the voltage, and "I" is the RMS value of the current.

D. Firmware: Software (programs or data) that has been written onto read-only memory (ROM). Firmware is a combination of software and hardware. Storage media with ROMs that have data or programs recorded on them are firmware.

E. KY Pulse: A method of measuring consumption of electricity that is based on a relay operating like a SPST switch.

F. KYZ Pulse: A method of measuring consumption of electricity based on a relay operating like a SPDT switch.

G. L-G: Line to ground.

H. L-L: Line to line.

I. L-N: Line to neutral.

J. MODBUS TCP/IP: An open protocol for exchange of process data.

K. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.

L. N-G: Neutral to ground.

M. Power Factor: The ratio of active power to apparent power, sometimes expressed in percentage.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Multifunction energy meters.
2. Power meters.
3. Power monitoring and control software.
4. Network configuration software.
5. System operator interfaces.
6. Raceways and boxes.
7. Wires and cables.
8. Surge protection devices.

B. Sustainable Design Submittals:

1. Product Data: Indicating that computers used by the system are certified by ENERGY STAR.

C. Shop Drawings: For power monitoring and control equipment.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, method of field assembly, components, and location and size of each field connection.

a. Attach copies of approved Product Data submittals for products (such as switchboards, switchgear, and motor-control centers) that describe the following:

1) Location of the meters and gateways, and routing of the connecting wiring.
2) Details of power monitoring and control features to illustrate coordination among related equipment and power monitoring and control.

3. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
4. Network naming and numbering scheme.
5. Include diagrams for power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.
6. Specifications for workstations.
7. UPS sizing calculations for workstation.
8. Surge Suppressors: Data for each device used and where applied.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Design Data:

1. Manufacturer's system installation and setup guides, with data forms to plan and record options and setup decisions.

a. Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format on compact disk or portable storage device with a USB interface.
b. Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.
c. As-built versions of submittal Product Data.
d. Names, addresses, e-mail addresses, and 24-hour telephone numbers of Installer and service representatives for the system and products.
e. Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing set points and variables.
f. Programming manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
g. Engineering, installation, and maintenance manuals that explain how to do the following:

1) Design and install new points, panels, and other hardware.
2) Perform preventive maintenance and calibration.
3) Debug hardware problems.
4) Repair or replace hardware.

h. Documentation of programs created using custom programming language including set points, tuning parameters, and object database.
i. Backup copy of graphic files, programs, and database on compact disk or portable storage device with a USB interface.
j. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
k. Complete original-issue copies of furnished software, including operating systems, custom programming language, workstation software, and graphics software on compact disk or portable storage device with a USB interface.
l. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
m. City of New York instruction materials.

2. Addressable Relays: One for every 10 installed. Furnish at least one of each type.
3. Data Line Surge Suppressors: One for every 10 of each type installed. Furnish at least one of each type.

1.7 COORDINATION

A. Coordinate features of distribution equipment and power monitoring and control components to form an integrated interconnection of compatible components.

1. Match components and interconnections for optimum performance of specified functions.

B. Coordinate Work of this Section with those in Sections specifying distribution components that are monitored or controlled by power monitoring and control equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Microprocessor-based monitoring and control of electrical power distribution system(s) that includes the following:

1. Electrical meters that monitor, control, and connect to the data transmission network.
2. LAN: High-speed, multi-access, open, nonproprietary, industry-standard communication protocols.
3. Include multiple PC-based workstations with web access, with its operating system and application software, connected to data transmission network.

B. The electrical power monitoring and control system must be Internet based.

1. System software must be based on server thin-client architecture, designed around open standards of internet technology.
2. Intent of thin-client architecture is to provide operators complete access to power monitoring and control system via an Internet browser. No special software other than an Internet browser must be required to access graphics, point displays, and trends; to configure trends, points, and controllers; and to edit programming.

3. Internet access must be password protected.

C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with UL 61010-1 and marked for intended location and application.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Protection: For external wiring of each conductor entry connection to components to protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads.

1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements as recommended by manufacturer for type of line being protected.

B. Addressable Devices: Transmitters and receivers must communicate unique device identification and status reports to monitoring and control clients.

C. Interface with Direct digital control System for HVAC: Provide factory-installed hardware and software to enable the Direct digital control system for HVAC to monitor, display, and record data for use in processing reports.

1. Hardwired Monitoring Points: Electrical power demand (kilowatts), electrical power consumption (kilowatt-hours), power factor.
2. ASHRAE 135 (BACnet) communication interface with the Direct digital control system for HVAC must enable the Direct digital control system for HVAC operator to remotely monitor meter information from a Direct digital control system for HVAC workstation. Control features and monitoring points displayed locally at metering panel must be available through the Direct digital control system for HVAC.

D. Backup Power Source:

1. Electrical power distribution equipment served by a backup power source for controls must have associated power monitoring and control system products that monitor and control such systems and equipment also served from a backup power source.

2.3 MULTIFUNCTION ENERGY METERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. General Electric Company (GE Power).
3. Leviton Manufacturing Co., Inc.
4. Schneider Electric USA, Inc.
5. Or approved equal.

B. Multifunction Energy Meter: Separately mounted, modular, permanently installed, solid-state, digital I/O instrument for power and energy metering and monitoring; complying with UL 61010-1.

1. Capable of metering four-wire wye, three-wire wye, three-wire delta, and single-phase power systems.
2. Equipped with security lock to protect revenue related metering from unauthorized and accidental changes.

C. Comply with IEC 60529 degree of protection code of IP65 for the front of the meter, and code of IP30 for the body.

D. Overvoltage: Comply with UL 61010-1 overvoltage withstand rating for CAT III.

E. Accuracy:

1. Comply with ANSI C12.20, Class 0.5.
2. Neutral Current Measurement: Not more than 0.65 percent.
3. Power Factor: 1.0 percent.
4. Frequency: 0.1 percent.
5. THD: 1.0 percent.
6. Waveform Sampling: 64 per cycle.

F. Data Link:

1. MODBUS TIA-485, RTU protocol, 2 4-wire connection to host devices with a compatible port.

G. Meter Physical Characteristics:

1. Display: Backlit LCD with antiglare and scratch-resistant lens.
2. Display of Metered Values:

a. One screen to show at least three user-selected values displayed at the same time. Selections available to display must include the following:

1) Meters.
2) Measurements.
3) THD.
4) Energy.
5) Demand.
6) Minimum and maximum values.
7) Power demand.

H. Sampling Rate: Continuously sample and record voltage and current at a rate not less than 64 samples per cycle, simultaneously on voltage and current channels of the meter.

I. Meters:

1. Instantaneous, RMS:

a. Current: Each phase, neutral and three-phase average.
b. Voltage: L-L each phase, L-L three-phase average, L-N each phase, and L-N three-phase average.

c. Active Power (kW): Each phase and three-phase total.
d. Reactive Power (kVAR): Each phase and three-phase total.
e. Apparent Power (kVA): Each phase and three-phase total.
f. Power Factor: Each phase and three-phase total.

2. Energy:

a. Active Energy (kWh): Three-phase total.

3. Demand, Derived from Instantaneous RMS Meters:

a. Current: Present and maximum.
b. Active: Present and maximum.
c. Reactive: Present and maximum.
d. Apparent: Present and maximum.

4. Power Quality Measurements:

a. THD: Current and voltage from measurements simultaneously from the same cycle, as can be calculated from the specified sampling rate.

J. I/O: Two optically isolated digital outputs for KY pulsing or control. Output signal characteristics must be 150 mA at 200 V.

1. KY Pulse: Generate standard KY pulses for a user-defined increment of metered active energy as follows:

a. User-defined pulse output, associated with kWh.
b. User-defined pulse output, associated with kVARh.

K. Capacities and Characteristics:

1. Power Supply: 120 V(ac), 60 Hz.
2. Circuit Connections:

a. Voltage: Measurement autoranging, 60 to 400 V(ac) L-N. Meter impedance must be 2 megohm L-L or greater. Overload Tolerance: 1500 V(ac), RMS, continuously.
b. Current: Connect to instrument grade current transformer with a metering range of 5 mA to 6 A. Overcurrent tolerance of the instrument must be 10 A continuous, 50 A for 10 seconds once per hour, and 120 A for one second per hour.
c. Frequency: 45 to 65 Hz.
d. Time: Input from a GPS receiver to synchronize the internal clock of the instrument and to time-synchronize this instrument with the network to a deviation of not greater than 1 ms.

2.4 POWER METERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.

2. General Electric Company (GE Power).
3. Leviton Manufacturing Co., Inc.
4. Schneider Electric USA, Inc.
5. Siemens Industry, Inc., Energy Management Division.
6. Or approved equal.

B. Description: Separately mounted, modular, permanently installed, solid-state, digital I/O instrument for power monitoring and control; complying with UL 61010-1.

1. Capable of metering four-wire wye, three-wire wye, three-wire delta, and single-phase power systems.
2. Equipped with security lock to protect revenue related metering from unauthorized and accidental changes.

C. Comply with IEC 60529 degree of protection code of IP51 for the front of the meter, and code of IP30 for the body.

D. Overvoltage: Comply with UL 61010-1 overvoltage withstand rating for CAT III.

E. Accuracy:

1. Comply with ANSI C12.20, Class 0.5.
2. Neutral Current Measurement: Not more than 0.65 percent.
3. Power: 0.6 percent.
4. Power Factor: 0.5 percent.
5. Active Energy: 0.6 percent.
6. Reactive Energy: 2.5 percent.
7. Frequency: 0.05 percent.
8. THD: 1.0 percent.
9. Waveform Sampling: 32 per cycle.

F. Data Link:

1. MODBUS TIA-485 RTU protocol, 2 4-wire connection.

    a. Provide for firmware and software updates through the communications port.

G. Meter Physical Characteristics:

1. Display: Backlit LCD with antiglare and scratch-resistant lens.
2. Display of Metered Values: One screen to show at least four lines of user-selected values on one screen at the same time. Provide graphical representation of user-selected values. The screen selections available at the display must include the following:

    a. Meters, including those listed under the following:

        1) Measurements.
        2) THD.
        3) Energy.
        4) Demand.

5) Minimum and maximum values.
6) Power demand.

H. Sampling Rate: Continuously sample and record voltage and current at a rate not less than 32 samples per cycle, simultaneously on voltage and current channels of the meter.

I. Meters:

1. Measurements: Instantaneous, in real time, RMS to the 15th harmonic.

   a. Voltage: L-L each phase, L-N each phase, and three-phase average.
   b. Current: Each phase, three-phase average, and neutral.
   c. Unbalanced current, L-L V(ac) and L-N V(ac).
   d. Active Power (+/- kW): Each phase and three-phase total.
   e. Reactive Power (+/- kVAR): Each phase and three-phase total.
   f. Apparent Power (+/- kVA): Each phase and three-phase total.
   g. Displacement Power Factor: Each phase and three-phase total.
   h. Distortion Power Factor: Each phase and three-phase total.
   i. Frequency.

2. THD from measurements simultaneously from the same cycle, through 15th harmonic.

   a. Voltage THD: L-L each phase, L-N each phase, and three-phase average.
   b. Current THD: Each phase and three-phase average.
   c. Total demand distortion.

3. Energy: Accumulated, indicate whether in-flow or out-flow, net and absolute values. Store the values in instrument's nonvolatile memory.

   a. Active kWh.
   b. Reactive kVARh.
   c. Apparent kVAh.

4. Demand: Present, last, predicted, peak.

   a. Three-phase average current.
   b. Three-phase total active power (kW).
   c. Reactive power (kVAR).
   d. Apparent power (kVA).

5. Minimum and Maximum Values:

   a. L-L and L-N voltages.
   b. Current in each phase.
   c. Power factor.
   d. Active power total.
   e. Reactive power total.
   f. Apparent power total.
   g. THD L-L and L-N voltages.
   h. THD current in each phase.

i. Frequency.

J. Power Demand, User Selectable:

1. Thermal Demand: Sliding window updated every second for the present demand and at end of the interval for the last interval. Adjustable window that can be set in 1-minute intervals, from 1 to 60 minutes.
2. Block Interval with Optional Subintervals: Adjustable for 1-minute intervals, from 1 to 60 minutes. User-defined parameters for the following block intervals:

    a. Sliding block that calculates demand every second, with intervals less than 15 minutes, and every 15 seconds with an interval between 15 and 60 minutes.
    b. Fixed block that calculates demand at end of the interval.
    c. Rolling block subinterval that calculates demand at end of each subinterval and displays it at end of the interval.

3. Demand Calculation Initiated by a Synchronization Signal:

    a. Signal is a pulse from an external source. Demand period begins with every pulse. Calculation must be configurable as either a block or rolling block calculation.
    b. Signal is a communication signal. Calculation must be configurable as either a block or rolling block calculation.
    c. Provide for synchronizing the demand with the internal of this instrument.

K. Data Recording: Store the listed values in instrument's nonvolatile memory, indicate which of the three phases relates to the value. Attach a date and time stamp to the peak values and the alarms.

1. Minimum and maximum of real-time RMS measurement.
2. Energy.
3. Demand values.
4. Alarms, store the last 40 events.

L. Alarms: Transmit a digital output and show on display when alarmed. Provide for no fewer than 15 metered items. Each alarm must be user configured, by using the following options:

1. Date and time stamp.
2. Enable-disable (default) or enable.
3. Pickup magnitude.
4. Pickup time delay.
5. Dropout magnitude.
6. Dropout time delay.
7. Alarm type.
8. Alarm label.

M. Output Signals: Provide two mechanical relays, rated not less than 250 V(ac), 2 A resistive, and rated for 200,000 cycles or more. The relays must be user configurable in one of the following listed modes:

1. Normal contact closure where the contacts change state for as long as the signal exists.
2. Latched mode when the contacts change state when a pickup signal is received and are held until a dropout signal is received.

3. Timed mode when the contacts change state when a pickup signal is received and are held for a preprogrammed duration.

N. Meter Face:

1. Display: Backlit LCD display, six lines, with antiglare and scratch-resistant lens.
2. Display of Metered Values: One screen to show at least four user-selected values on one screen at the same time.
3. Provide for the reset of metered peak values.

O. Capacities and Characteristics:

1. Power Supply: 120 V(ac), 60 Hz.
2. Circuit Connections:

a. Voltage: Measurements autoranging, 60 to 400 V(ac) L-N. Meter impedance must be 2 megohm L-L or greater. Overload Tolerance: 1500 V(ac), RMS, continuously.
b. Current: Connect to instrument grade current transformer with a metering range of 5 mA to 6 A. Overcurrent tolerance of the instrument must be 10 A continuous, 50 A for 10 seconds once per hour, and 120 A for one second per hour.
c. Frequency: 45 to 65 Hz.
d. Time: Input from a GPS receiver to synchronize the internal clock of the instrument and to time-synchronize this instrument with the network to a deviation of not greater than 1 ms.

2.5 NETWORK CONFIGURATION SOFTWARE

A. Network Management Graphical Interface Features:

1. Add and remove devices in the power monitoring and control network.
2. Application for naming devices based on a user-defined naming scheme.
3. Add and remove I/O servers in the power monitoring and control network.
4. Edit communication properties for devices including timeouts and delays.
5. Display mandatory fields when adding a new device.
6. Allow to manually connect and disconnect serial, Ethernet, modem, and Ethernet gateway sites.
7. Enable and disable devices and sites in the power monitoring and control network without interruption to other devices or sites.
8. Pool modem resources so that the software uses any available modem.
9. Monitor the following diagnostics:

a. Communication request/response and error rates, and timeouts.
b. Log acquisition services.

B. Database Maintenance Features:

1. Backup, archive, and trim data, event, and waveform logs.

a. Record start and end date for operation.
b. Allow copying data to another database.
c. Be capable of selecting logs specified for the meters that are Work of this Section.

1) Data logs.
2) Event logs.
3) Waveform logs.

C. Web Reporter: Allow viewing historical data in preformatted report templates via a web browser.

1. Features:

a. User-configurable report generator to trigger on event, based on a schedule, or manual initiation.
b. Format reports in HTML, PDF, TIF, Excel, XML, or user-selected printer, or network folder.
c. Distribution of reports via email.

2. Report on power and demand profiles.
3. Power quality report with CBEMA evaluation.
4. EN 50160 compliance report.
5. 100 ms PQ report.
6. Energy over Period Report:

a. User-defined rollup interval by day, week, month, or year.
b. Compare daily energy to the following:

1) Previous day.
2) Same day, previous week.
3) Same day, previous month.
4) User-defined specific day.

c. Compare weekly energy to the following:

1) Previous week.
2) Same week from previous month.
3) Same week from previous year.
4) User-defined specific week.

d. Compare monthly energy to the following:

1) Previous month.
2) Same month from previous year.
3) User-defined specific month.

e. Compare annual energy to the following:

1) Previous year.
2) User-defined specific year.

7. Energy by daily period report for the user-defined periods. Aggregate consumption of the periods by the day, week, and year.
8. Tabular Report: Show values for multiple measurements and measurements from multiple devices in tabular format.

9. Trend Report:

    a. Show values for multiple measurements and measurements from multiple devices in the following graphical formats:

        1) Line chart.
        2) Pie graph.
        3) Bar chart.
        4) Column chart.
        5) Smooth line chart.
        6) Stacked column chart.
        7) Stacked bar chart.

10. Alarm and Event History: User formatted, based on the meters and priority; and with user-defined alarm and event reports.
11. System Configuration Report:

    a. Device name.
    b. Device type.
    c. Device address.
    d. Connection status.
    e. Device protocol.
    f. Device description.

12. Each default report must include the following:

    a. Summary aggregation of data from the selected devices.
    b. Individual device information.
    c. Raw data.

13. The reporting tool must provide a graphical interface to create and manage multiple Time of Use schedules:

    a. Tariffs including energy cost rates per kWh, kVARh, and kVAh, and demand charges per kW, kVAR, and kVA.
    b. Off-peak and on-peak times.

2.6 SYSTEM OPERATOR INTERFACES

A. Operator means of system access must be through the following:

1. Desktop workstation with hardwired connection through LAN port.
2. Portable terminal with hardwired connection through LAN port at each meter.
3. Remote connection using outside of system PC, tablet, or phone using an internet portal.

2.7 RACEWAYS AND BOXES

A. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" for raceways for electrical power wiring and NFPA 70 Class 1 remote-control and signaling circuits.

B. Comply with requirements for control wiring, TIA-232 cable, and NFPA 70 Class 2 remote-control and signaling circuits.

2.8 WIRES AND CABLES

A. Electrical Power Wiring: Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

1. Copper conductors are Type THHN/THWN-2.

B. Control Wiring:

1. Balanced Twisted Pair Cable: 100 ohm, four-pair .
2. TIA-485 Cable: Paired, , twisted, No. 22 AWG, stranded (7x30) tinned-copper conductors.

C. TIA-232 Cable:

1. PVC-Jacketed, TIA-232 Cable: Paired, two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; PVC jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.

    a. Type CM.
    b. Flame Resistance: UL 1581, vertical tray.

2. Plenum-Type, TIA-232 Cable: Paired, two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; plastic jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.

    a. Type CMP.
    b. Flame Resistance: NFPA 262, flame test.

2.9 SURGE PROTECTION DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB (Electrification Products Division).
2. Advanced Protection Technologies Inc. (APT).
3. ALLTEC.
4. Eaton.
5. Emerson Electric Co.
6. LEA International.
7. Leviton Manufacturing Co., Inc.
8. Mersen USA.
9. PowerLogics, Inc./PQ Protection.
10. Schneider Electric USA, Inc.
11. Siemens Industry, Inc., Energy Management Division.

12. Or approved equal.

B. SPDs: Comply with UL 1449, Type 1 Type 2.

1. Include LED indicator lights for power and protection status.
2. Include Form-C contacts rated at 5 A and 250 V(ac), one normally open and one normally closed, for remote monitoring of protection status. Contacts must reverse on failure of surge diversion module or on opening of current-limiting device. Coordinate with building power monitoring and control system.

C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase must not be less than 100 kA. The peak surge current rating must be the arithmetic sum of the ratings of the individual metal-oxide varistors in a given mode.

D. Comply with UL 1283.

E. Protection modes and UL 1449 SPD for grounded wye circuits with 480Y/277 V 208Y/120 V, three-phase, four-wire circuits must not exceed the following:

1. L-N: 1200 V for 480Y/277 V 700 V for 208Y/120 V.
2. L-G: 1200 V for 480Y/277 V 700 V for 208Y/120 V.
3. N-G: 1200 V for 480Y/277 V 700 V for 208Y/120 V.
4. L-L: 2000 V for 480Y/277 V 1200 V for 208Y/120 V.

F. Protection modes and UL 1449 SPD for 240/120 V, single-phase, three-wire circuits must not exceed the following:

1. L-N: 700 V.
2. L-G: 700 V.
3. N-G: 700 V.
4. L-L: 1200 V.

G. SCCR: Equal or exceed 100 or 200 or 300 kA.

H. Nominal Rating: 20 10 kA.

I. Indoor Enclosures: NEMA 250, Type 1.

J. Outdoor Enclosures: NEMA 250, Type 3R Type 4 Type 4X.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF POWER MONITORING AND CONTROL SYSTEMS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

C. Wiring and Cabling Installation:

1. Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical power wiring.

D. Raceways Installation:

1. Comply with Section 260533.13 "Conduits for Electrical Systems" for electrical power wiring and NFPA 70 Class 1 remote-control and signaling circuits.
2. Comply with for control wiring, TIA-232 cable, and NFPA 70 Class 2 remote-control and signaling circuits.

E. Identification Installation:

1. Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical power wiring.
2. Comply with Section 271513 "Communications Copper Horizontal Cabling" for identification products and cable management system requirements for twisted pair cable, TIA-485 cable, control-voltage cable, and TIA-232 cable.

3.4 INSTALLATION OF WORKSTATIONS

A. Graphics Application:

1. Use system schematics indicated as starting point to create graphics.
2. Develop Project-specific library of symbols for representing system equipment and products.
3. Incorporate digital images of Project-completed installation into graphics where beneficial to enhance effect.
4. Submit sketch of graphic layout with description of text for each graphic for Commissioner's review before creating graphic using graphics software.
5. Seek Commissioner input in graphics development once using graphics software.

6. Final editing must be done on-site with Commissioner's review and feedback.
7. Refine graphics as necessary for Commissioner acceptance.
8. On receiving Commissioner acceptance, print a hard copy to include in operation and maintenance manual. Prepare a scanned copy PDF file of each graphic and include with softcopy of the system operation and maintenance manual.

3.5 NETWORK NAMING AND NUMBERING

A. Coordinate with Commissioner and provide unique naming and addressing for networks and devices.

3.6 GROUNDING

A. For data communication wiring, comply with BICSI N1.

B. For control-voltage wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.7 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Visually inspect balanced twisted pair cabling and optical-fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of components.
4. Test balanced twisted pair cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.

    a. Test instruments must meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    b. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

5. Optical-Fiber Cable Tests:

    a. Test instruments must meet or exceed applicable requirements in TIA-568-C.0. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    b. Link End-to-End Attenuation Tests:

1) Multimode Link Measurements: Test at 850 or 1300 nm in one direction according to IEC 61280-4-1.
2) Attenuation test results for links must be less than that calculated according to equation in TIA-568-C.0.

c. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

6. Power Monitoring and Control System Tests.

a. Test Analog Signals:

1) Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2) Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3) Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

b. Test Digital Signals:

1) Check digital signals using a jumper wire.
2) Check digital signals using an ohmmeter to test for contact making or breaking.

c. I/O Control Loop Tests:

1) Test every I/O point to verify that safety and operating control set points are as indicated and as required to operate controlled system safely and at optimum performance.
2) Test every I/O point throughout its full operating range.
3) Test every control loop to verify that operation is stable and accurate.
4) Adjust control loop proportional, integral, and derivative settings to achieve optimum performance while complying with performance requirements indicated. Document testing of each control loop's precision and stability via trend logs.
5) Test and adjust every control loop for proper operation according to sequence of operation.
6) Test software and hardware interlocks for proper operation.
7) Operate each analog point at the following:

a) Upper quarter of range.
b) Lower quarter of range.
c) At midpoint of range.

8) Exercise each binary point.
9) For every I/O point in the system, read and record each value at workstation, at controller, and at field instrument simultaneously. Value displayed at workstation and at field instrument must match.

10) Prepare and submit a report documenting results for each I/O point in the system, and include in each I/O point a description of corrective measures and adjustments made to achieve desire results.

C. Nonconforming Work:

1. Wiring and cabling will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 FINAL REVIEW

A. Submit written request to Commissioner when the power monitoring and control system is ready for final review. Written request must state the following:

1. The system has been thoroughly inspected for compliance with Contract Documents and found to be in full compliance.
2. The system has been calibrated, adjusted, and tested and found to comply with requirements of operational stability, accuracy, speed, and other performance requirements indicated.
3. The system monitoring and control of electrical distribution systems results in operation according to sequences of operation indicated.
4. The system is complete and ready for final review.

B. Review by Commissioner will be made after receipt of written request. A field report must be issued to document observations and deficiencies.

C. Take prompt action to remedy deficiencies indicated in field report and submit a second written request when deficiencies have been corrected. Repeat process until no deficiencies are reported.

D. Final review must include a demonstration to parties participating in final review.

3.9 INSTRUCTION

A. Attendee instruction materials:

1. Provide each attendee with a color hard copy of instruction materials and visual presentations.
2. Hard-copy materials must be organized in a three-ring binder with table of contents and individual divider tabs marked for each logical grouping of subject matter.
3. In addition to hard-copy materials included in instruction manual, provide each binder with a sleeve or pocket that includes a DVD or flash drive with PDF copy of hard-copy materials.

B. On-Site Instruction:

1. City of New York will provide conditioned space with ample desks or tables, chairs, power, and data connectivity for instructor and each attendee.
2. Instructor must provide instruction materials, projector, and other audiovisual equipment used in instruction.
3. Provide as much of instruction located on-site as deemed feasible and practical by Commissioner.

4. On-site instruction must include regular walk-through tours, as required, to observe each unique product type installed with hands-on review of operation.
5. The workstation provided with the system must be used in instruction. If workstation is not indicated, provide a temporary workstation to convey instruction content.
6. Provide a workstation for use by each attendee.

C. At Completion of instruction: Staff familiar with the system installed are capable of demonstrating operation of the system during final review.

D. Demonstration must include, but not be limited to, the following:

1. Accuracy and calibration of 10 I/O points randomly selected by reviewers. If review finds that some I/O points are not properly calibrated and not satisfying performance requirements indicated, additional I/O points may be selected by reviewers until total I/O points being reviewed that satisfy requirements equals quantity indicated.
2. Reporting of alarm conditions for randomly selected alarms, including different classes of alarms, to ensure that alarms are properly received by operators and workstations.
3. Trends, summaries, logs, and reports set-up for Project.
4. Software's ability to communicate with controllers, workstations, and uploading and downloading of control programs.
5. Software's ability to edit control programs off-line.
6. Data entry to show Project-specific customizing capability including parameter changes.
7. Step through penetration tree, display graphics, demonstrate dynamic update, and direct access to graphics.
8. Execution of digital and analog commands in graphic mode.
9. Spreadsheet and curve plot software and its integration with database.
10. Online user guide and help functions.
11. For Each Meter:

    a. Memory: Programmed data, parameters, trend, and alarm history collected during normal operation is not lost during power failure.
    b. Operator Interface: Ability to connect directly to each meter with a portable workstation.
    c. Wiring Labels: Match control drawings.
    d. Network Communication: Ability to locate a meter on the network. Communication architecture matches Shop Drawings.
    e. Nameplates and Tags: Accurate and permanently attached to control panel doors, instrument, actuators, and devices.

12. For Each Workstation:

    a. I/O point lists agree with naming conventions.
    b. Graphics are complete.
    c. UPS unit, if applicable, operates.

END OF SECTION 260913

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Outdoor photoelectric switches, solid state, flexible mounting.
2. Daylight-harvesting switching controls.
3. Daylight-harvesting dimming controls, digital.
4. Indoor occupancy and vacancy sensors.
5. Conductors and cables.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Outdoor photoelectric switches, solid state, flexible mounting.
2. Daylight-harvesting switching controls.
3. Daylight-harvesting dimming controls, digital.
4. Indoor occupancy and vacancy sensors.
5. Conductors and cables.

B. Shop Drawings:

1. Show installation details for the following:

   a. Occupancy sensors.
   b. Vacancy sensors.

2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer warrants that installed lighting control devices perform in accordance with specified requirements and agrees to repair or replace, including labor, materials, and equipment, devices that fail to perform as specified within warranty period.

1. Failures include, but are not limited to, the following:

   a. Faulty operation of lighting control software.
   b. Faulty operation of lighting control devices.

2. Warranty Period: Three year(s) from date of Substantial Completion.

1.7 OUTDOOR PHOTOELECTRIC SWITCHES, SOLID STATE, FLEXIBLE MOUNTING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Intermatic, Inc.
3. Leviton Manufacturing Co., Inc.
4. NSi Industries LLC.
5. TE Connectivity Ltd.
6. Or approved equal.

B. Description: Solid state, with SPST DPST dry contacts rated for 1800 VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.

3. Time Delay: Fifteen-second minimum, to prevent false operation.
4. Surge Protection: Metal-oxide varistor.
5. Mounting: Twist lock complies with ANSI C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure from same source and manufacturer as switch.
6. Failure Mode: Luminaire stays ON.

1.8 DAYLIGHT-HARVESTING SWITCHING CONTROLS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Hubbell Control Solutions; Hubbell Incorporated, Lighting.
3. Leviton Manufacturing Co., Inc.
4. Lithonia Lighting; Acuity Brands Lighting, Inc.
5. NSi Industries LLC.
6. Sensor Switch, Inc.
7. TE Connectivity Ltd.
8. WattStopper; Legrand North America, LLC.
9. Or approved equal.

B. Description: System operates indoor lighting.

C. Sequence of Operation: As daylight increases, the lights are turned off at a predetermined level. As daylight decreases, the lights are turned on at a predetermined level.

1. Lighting control set point is based on two lighting conditions:

a. When no daylight is present.
b. When significant daylight is present (target level).
c. System programming is done with two hand-held, remote-control tools.

D. Ceiling-Mounted Switching Controls:

1. Solid-state, light-level sensor unit, with integrated power pack, that detects changes in indoor lighting levels that are perceived by the eye.

E. Electrical Components, Devices, and Accessories:

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
3. Sensor Output:

a. Contacts rated to operate the associated power pack, complying with UL 773A. Sensor must be powered by the power pack.

4. Sensor type: Open loop Closed loop.
5. Zone: Single Multi.

6. Power Pack:

    a. Dry contacts rated for 20 A LED load at 120V(ac), for 13 A tungsten at 120 V(ac), and for 1 hp at 120 V(ac). Sensor has 24 V(dc), 150 mA, Class 2 power source.

        1) LED status lights to indicate load status.
        2) Plenum rated.

7. General Space Sensors Light-Level Monitoring Range: 10 to 200 fc, with an adjustment for turn-on and turn-off levels within that range.
8. Atrium Space Sensors Light-Level Monitoring Range: 100 to 1000 fc, with an adjustment for turn-on and turn-off levels within that range.
9. Skylight Sensors Light-Level Monitoring Range: 1000 to 10 000 fc, with an adjustment for turn-on and turn-off levels within that range.
10. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling.
11. Set-Point Adjustment: Equip with deadband adjustment of 25, 50, and 75 percent above the "on" set point, or provide with separate adjustable "on" and "off" set points.
12. Test Mode: User selectable, overriding programmed time delay to allow settings check.
13. Control Load Status: User selectable to confirm that load wiring is correct.
14. Indicator: Two digital displays to indicate the beginning of on-off cycles.

1.9 DAYLIGHT-HARVESTING DIMMING CONTROLS, DIGITAL

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Deep Roof Lighting.
2. Eaton.
3. Hubbell Control Solutions; Hubbell Incorporated, Lighting.
4. Leviton Manufacturing Co., Inc.
5. Lithonia Lighting; Acuity Brands Lighting, Inc.
6. WattStopper; Legrand North America, LLC.
7. Or approved equal.

B. Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, lights are dimmed.

1. Lighting control set point is based on the following two lighting conditions:

    a. When no daylight is present (target level).
    b. When significant daylight is present.

2. System programming is done with two hand-held, remote-control tools.

    a. Initial setup tool.
    b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.

C. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with integrated power pack, to detect changes in indoor lighting levels that are perceived by the eye.

D. Electrical Components, Devices, and Accessories:

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
2. Sensor Output: zero to 10 V(dc) to operate luminaires. Sensor is powered by controller unit.
3. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc.

E. Power Pack: Digital controller capable of accepting 8PSJ inputs with output(s) rated for LED load at 120V(ac), for LED at 120V(ac), and for at 120 V(ac). Sensor has 24 V(dc) Class 2 power source.

1. With integral current monitoring.
2. Compatible with digital addressable lighting interface.
3. Plenum rated.

1.10 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bryant Electric.
2. Douglas Lighting Controls.
3. Eaton.
4. Hubbell Control Solutions; Hubbell Incorporated, Lighting.
5. Intermatic, Inc.
6. Leviton Manufacturing Co., Inc.
7. Lithonia Lighting; Acuity Brands Lighting, Inc.
8. Lutron Electronics Co., Inc.
9. NSi Industries LLC.
10. Philips; Signify North America; Signify Holding.
11. RAB Lighting.
12. Sensor Switch, Inc.
13. Square D; Schneider Electric USA.
14. WattStopper; Legrand North America, LLC.
15. Or approved equal.

B. General Requirements for Sensors:

1. Wall Ceiling-mounted, solid-state indoor occupancy and vacancy sensors.
2. Passive infrared Ultrasonic Dual technology.
3. Integrated power pack.
4. Hardwired Wireless connection to switch and BAS ; and BAS and lighting control system.
5. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
6. Operation:

a. Combination Sensor: Unless otherwise indicated, sensor must be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

7. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A Sensor is powered from the power pack Wireless.
8. Power: Line voltage Integral photovoltaic collector.
9. Power Pack: Dry contacts rated for 20 A LED load at 120 and 277 V(ac), for 13 A tungsten at 120 V(ac), and for 1 hp at 120 V(ac). Sensor has 24 V(dc), 150 mA, Class 2 power source.
10. Mounting:

    a. Sensor: Suitable for mounting in any position in a standard device box or outlet box.
    b. Relay: Externally mounted through a 1/2 inch knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
12. Bypass Switch: Override the "on" function in case of sensor failure.
13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

C. PIR Type: Wall Ceiling mounted; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of 6 inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch.
2. Detection Coverage (Room, Ceiling Mounted): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96 inch high ceiling.

D. Ultrasonic Type: Wall Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.

1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.
2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96 inch high ceiling.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96 inch high ceiling.
4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96 inch high ceiling.
5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 ft. when mounted on a 10 ft. high ceiling in a corridor not wider than 14 ft..
6. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 sq. ft. 2000 sq. ft. 3000 sq. ft. when mounted 84 inch above finished floor.

E. Dual-Technology Type: Wall Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.

2. Detector Sensitivity: Detect occurrences of 6 inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch, and detect a person of average size and weight moving not less than 12 inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96 inch high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 sq. ft. 2000 sq. ft. 3000 sq. ft. when mounted 48 inch above finished floor.

1.11 LIGHTING CONTACTORS

A. Description: Electrically operated and mechanically or electrically held, combination-type lighting contactors with nonfused disconnect, complying with NEMA ICS 2 and UL 508.

1. Provide with control and pilot devices as indicated on Drawings and scheduled, matching the NEMA type specified for the enclosure.

1.12 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 No. 22 No. 24 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 No. 16 No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 2 -

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF SENSORS

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's instructions.

3.4 INSTALLATION OF CONTACTORS

A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.5 INSTALLATION OF WIRING

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's instructions.

C. Size conductors in accordance with lighting control device manufacturer's instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

3.6 IDENTIFICATION

A. Identify components and power and control wiring in accordance with Section 260553 "Identification for Electrical Systems.

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.7 FIELD QUALITY CONTROL

A. Field tests must be witnessed by Commissioner.

B. Tests and Inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Nonconforming Work:

1. Lighting control devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Prepare test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support or supervise field tests and inspections.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit City of New York's operations.
2. For daylighting controls, adjust set points and deadband controls to suit City of New York's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

END OF SECTION 260923

SECTION 262413 - SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Switchboards.
2. Surge protection devices.
3. Disconnecting and overcurrent protective devices.
4. Accessory components and features.

B. Related Requirements

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260573.19 "Arc-Flash Hazard Analysis" for arc-flash analysis and arc-flash label requirements.

1.3 COORDINATION

A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Switchboards.
2. Overcurrent protective devices.
3. Surge protection devices.
4. Groud-fault protection devices.
5. Accessories.
6. Other components.
7. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types for types other than UL 50E, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
5. Include descriptive documentation of optional barriers specified for electrical insulation and isolation.
6. Detail utility company's metering provisions with indication of approval by utility company.
7. Include evidence of listing, by qualified electrical testing laboratory for series rating of installed devices.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.
10. Include diagram and details of proposed mimic bus.
11. Include schematic and wiring diagrams for power, signal, and control wiring.

C. Samples: Representative portion of mimic bus with specified material and finish, for color selection.

D. Field Quality-Control Submittals:

1. Field Quality-Control Reports:

a. Test procedures used.
b. Test results that comply with requirements.
c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Handling, storing, and providing temporary heat.
2. Mounting accessories and anchoring devices.
3. Testing and adjusting overcurrent protective devices.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.

B. Remove loose packing and flammable materials from inside switchboards and connect factory-installed space heaters to temporary electrical service to prevent condensation.

C. Handle and prepare switchboards for installation in accordance with NECA 400.

1.9 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that switchboard performs in accordance with specified requirements and agrees to provide repair or replacement of components that fail to perform as specified within warranty period.

1. Warranty Period: Three years from date of Substantial Completion; prorated coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.
5. Or approved equal.

B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

E. Comply with NEMA PB 2.

F. Comply with NFPA 70.

G. Comply with UL 891.

H. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Panel mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

I. Indoor Enclosures: Steel, UL 50E, Type 1 Type 2.

J. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over rust-inhibiting primer on treated metal surface.

K. Service Entrance Rating: Switchboards intended for use as service entrance equipment may contain from one to six service disconnecting means with overcurrent protection, neutral bus with disconnecting link, grounding electrode conductor terminal, and main bonding jumper.

L. Utility Metering Compartment: Barrier compartment and section complying with utility company's requirements; hinged sealable door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.

M. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

N. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

O. Pull Box on Top of Switchboard:

1. Adequate ventilation to maintain temperature in pull box within same limits as switchboard.
2. Set back from front to clear circuit-breaker removal mechanism.
3. Removable covers may form top, front, and sides. Top covers at rear must be easily removable for drilling and cutting.
4. Bottom must be insulating, fire-resistive material with separate holes for cable drops into switchboard.
5. Cable supports must be arranged to facilitate cabling and adequate to support cables indicated, including those for future installation.

P. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from front of switchboard.
2. Phase- and Neutral-Bus Material:

    a. Hard-drawn copper of 98 percent conductivity, silver-plated.

3. Copper feeder circuit-breaker line connections.

4. Load Terminals: Insulated, rigidly braced, runback bus extensions, of same material as through buses, equipped with compression connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full-ampere rating of circuit-breaker position.
5. Ground Bus: Minimum-size required by UL 891, hard-drawn copper of 98 percent conductivity, equipped with compression connectors for feeder and branch-circuit ground conductors.
6. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
7. Disconnect Links:

    a. Isolate neutral bus from incoming neutral conductors.
    b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.
8. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.

Q. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

R. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Minimum insulation temperature rating of 105 deg C.

S. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components including instruments and instrument transformers.

2.2 SURGE PROTECTION DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Advanced Protection Technologies Inc. (APT).
3. Eaton.
4. Siemens Industry, Inc., Energy Management Division.
5. Square D; Schneider Electric USA.
6. Or approved equal.

B. SPDs: Listed and labeled in accordance with UL 1449, Type 1 Type 2.

C. Features and Accessories:

1. Integral disconnect switch.
2. Internal thermal protection that disconnects SPD before damaging internal suppressor components.
3. Indicator light display for protection status.
4. Form-C contacts rated at 5 A and 250 V(ac), one normally open and one normally closed, for remote monitoring of protection status.
5. Surge counter.

D. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase may not be less than 200 kA. Peak surge current rating must be arithmetic sum of ratings of individual MOVs in each mode.

E. Protection modes and UL 1449 VPR for grounded wye circuits with 208Y/120 V, three-phase, four-wire circuits may not exceed the following:

1. Line to Neutral: 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 208Y/120 V.
3. Line to Line: 1000 V for 208Y/120 V.

F. SCCR: Equal or exceed 100 kA.

G. Nominal Rating: 20 kA.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

B. Fuses are specified in Section 262813 "Fuses."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Receive, inspect, handle, and store switchboards in accordance with NECA 400.

1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's published instructions.
2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
3. Protect from moisture, dust, dirt, and debris during storage and installation.
4. Install temporary heating during storage in accordance with manufacturer's published instructions.

B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.

C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect performance of equipment.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

3.4 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Switchboards and Accessories: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 400.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Techniques:

1. Equipment Mounting: Install switchboards on concrete base, 4 inch nominal thickness. Comply with requirements for concrete base specified in Section 260529 "Hangers and Supports for Electrical Systems."

    a. Install conduits entering underneath switchboard, entering under vertical section where conductors will terminate. Install with couplings flush with concrete base. Extend 2 inch above concrete base after switchboard is anchored in place.
    b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18 inch centers around full perimeter of concrete base.
    c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
    d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, published instructions, and directions furnished with items to be embedded.
    e. Install anchor bolts to elevations required for proper attachment to switchboards.
    f. Anchor switchboard to building structure at top of switchboard if required or recommended by manufacturer.

2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.
3. Operating Instructions: Frame and mount printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
4. Install filler plates in unused spaces of panel-mounted sections.
5. Install overcurrent protective devices, surge protection devices, and instrumentation.

    a. Set field-adjustable switches and circuit-breaker trip ranges.

6. Install spare-fuse cabinet.

3.5 CONNECTIONS

A. Bond conduits entering underneath switchboard to equipment ground bus with bonding conductor sized in accordance with NFPA 70.

B. Support and secure conductors within switchboard in accordance with NFPA 70.

C. Extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3.6 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Switchboard Nameplates: Label each switchboard compartment with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Mimic Bus:

1. Entire single-line switchboard bus work, as depicted on factory record drawing, on minimum 0.032 inch thick anodized aluminum photoengraved nameplate, located at eye level on front cover of switchboard incoming service section.
2. Entire single-line switchboard bus work, as depicted on factory record drawing, on engraved minimum 0.0625 inch thick laminated-plastic (Gravoply) nameplate, located at eye level on front cover of switchboard incoming service section.
3. Continuously integrated mimic bus factory applied to front of switchboard. Arrange in single-line diagram format, using symbols and letter designations consistent with final mimic-bus diagram.
4. Coordinate mimic-bus segments with devices in switchboard sections to which they are applied. Produce concise visual presentation of principal switchboard components and connections.
5. Presentation Media: Painted graphics in color contrasting with background color to represent bus and components, complete with lettered designations.

E. Service Equipment Label: Labeled, by qualified electrical testing laboratory for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

3.7 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Acceptance Testing:

a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
b. Test continuity of each circuit.

2. Test ground-fault protection of equipment for service equipment in accordance with NFPA 70.
3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
4. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
5. Perform the following infrared scan tests and inspections, and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each switchboard. Remove front and rearpanels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.
    c. Instruments and Equipment:

        1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

6. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

C. Nonconforming Work:

1. Switchboard will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports, including certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.8 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

3.9 PROTECTION

A. Temporary Heating: Apply temporary heat, to maintain temperature in accordance with manufacturer's published instructions, until switchboard is ready to be energized and placed into service.

END OF SECTION 262413

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Power panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Disconnecting and overcurrent protective devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 DEFINITIONS

A. GFEP: Ground-fault equipment protection.

B. MCCB: Molded-case circuit breaker.

C. VPR: Voltage protection rating.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Power panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Load centers.

4. Electronic-grade panelboards.
5. Disconnecting and overcurrent protective devices.
6. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
7. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of listing, by qualified electrical testing laboratory for series rating of installed devices.
7. Include evidence of listing, by qualified electrical testing laboratory for SPD as installed in panelboard.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include wiring diagrams for power, signal, and control wiring.
10. Key interlock scheme drawing and sequence of operations.
11. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device. Include Internet link for electronic access to downloadable PDF of coordination curves.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

B. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Recommended procedures for installing panelboards.
2. Recommended torque settings for bolted connections on panelboards.
3. Recommended temperature range for energizing panelboards.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation in accordance with NECA 407.

1.9 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that panelboards perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: Four years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearences between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions

B. Electrical Components, Devices and Accessories: Liste and labeled in accordance with NFPA 70, by qualified electrical testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

E. Enclosures: Flush Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: UL 50E, Type 1.

2. Height: 7 ft maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims must cover live parts and may have no exposed hardware.
4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
6. Finishes:

a. Panels and Trim: Steel , factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Same finish as panels and trim.

F. Incoming Mains:

1. Location: Convertible between top and bottom.
2. Main Breaker: Main lug interiors up to 400 A must be field convertible to main breaker.

G. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

a. Plating must run entire length of bus.
b. Bus must be fully rated for entire length.

2. Interiors must be factory assembled into unit. Replacing switching and protective devices may not disturb adjacent units or require removing main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
5. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and listed and labeled, by qualified electrical testing laboratory as suitable for nonlinear loads in electronic-grade panelboards and others designated on Drawings. Connectors must be sized for double-sized or parallel conductors as indicated on Drawings.
6. Do not mount neutral bus in gutter.

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H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations must allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Compression type, with lug on neutral bar for each pole in panelboard.
5. Ground Lugs and Bus-Configured Terminators: Compression type, with lug on bar for each pole in panelboard.
6. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
7. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
8. Gutter-Tap Lugs: Compression type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.

I. Quality-Control Label: Panelboards or load centers must be labeled, by qualified electrical testing laboratory recognized for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers must have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

J. Future Devices: Panelboards or load centers must have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

1. Percentage of Future Space Capacity: 20 percent.

K. Panelboard Short-Circuit Current Rating:

1. Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed, by qualified electrical testing laboratory for 100 percent interrupting capacity.

a. Panelboards and overcurrent protective devices rated 240 V or less must have short-circuit ratings as shown on Drawings, but not less than 10 000 A(rms) symmetrical.
b. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V must have short-circuit ratings as shown on Drawings, but not less than 14 000 A(rms) symmetrical.

L. Surge Suppression: Factory installed as integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

2.2 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. ESL Power Systems, Inc.
4. Mersen USA.
5. Siemens Industry, Inc., Energy Management Division.
6. Square D; Schneider Electric USA.
7. Or approved equal.

B. Listing Criteria: NEMA PB 1, distribution type.

C. Doors: Shall be door-indoor construction and secured with Yale lock and #47 key.

1. For doors more than 36 inch high, provide two latches, keyed alike.

D. Mains: Circuit breaker Lugs only.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers .

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Bender Inc.; Bender GmbH & Co. KG.
3. Eaton.
4. Siemens Industry, Inc., Energy Management Division.
5. Square D; Schneider Electric USA.
6. Or approved equal.

B. Listing Criteria: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Door-in-door construction with concealed hinges; secured with flush latch with tumbler lock; keyed alike. Outer door must permit full access to panel interior. Inner door must permit access to breaker operating handles and labeling, but current carrying terminals and bus must remain concealed.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.
5. Or approved equal.

B. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

1. Fuses and Spare-Fuse Cabinet: Comply with requirements specified in Section 262813 "Fuses."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards in accordance with NECA 407.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Panelboards: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 407.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Techniques:

1. Equipment Mounting:

   a. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
   b. Attach panelboard to vertical finished or structural surface behind panelboard.
   c. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.

2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
3. Mount top of trim 7.5 ft above finished floor unless otherwise indicated.
4. Mount panelboard cabinet plumb and rigid without distortion of box.
5. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
6. Install overcurrent protective devices and controllers not already factory installed.

   a. Set field-adjustable, circuit-breaker trip ranges.
   b. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver in accordance with manufacturer's published instructions.

7. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
8. Install filler plates in unused spaces.
9. Stub four 1 inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in future. Stub four 1 inch empty conduits into raised floor space or below slab not on grade.

10. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
11. Mount spare fuse cabinet in accessible location.

D. Interfaces with Other Work:

1. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Panelboard Nameplates: Label each panelboard with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each branch circuit device in power panelboards with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

E. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles must be located on interior of panelboard door.

F. Breaker Labels: Faceplate must list current rating, UL and IEC certification standards, and AIC rating.

G. Circuit Directory:

1. Provide directory card inside panelboard door, mounted in metal frame with transparent protective cover.

    a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.

2. Provide computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

    a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.

3. Create directory to indicate installed circuit loads after balancing panelboard loads; incorporate City of New York's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

3.5 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Field tests and inspections must be witnessed by Commissioner.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Perform optional tests. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
    c. Instruments and Equipment:

        1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

D. Nonconforming Work:

1. Panelboards will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

E. Collect, assemble, and submit test and inspection reports, including certified report that identifies panelboards included and that describes scanning results, with comparisons of two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

F. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.6 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Commissioner of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by Commissioner. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within panelboard, may not exceed 20 percent.

3.7 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature in accordance with manufacturer's published instructions.

END OF SECTION 262416

SECTION 262713 - ELECTRICITY METERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Electricity meter.
2. Work to accommodate utility company revenue meters, and City of New York's electricity meters used to manage electrical power system.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 DEFINITIONS

A. KY or KYZ Pulse: Term used by metering industry to describe method of measuring consumption of electricity (kWh) that is based on relay opening and closing in response to rotation of disk in meter. Electronic meters generate pulses electronically.

1.4 COORDINATION

A. Electrical Service Connections:

1. Coordinate with utility companies and utility-furnished components.

a. Comply with requirements of utility providing electrical power services.
b. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. For each type of meter.
2. For metering infrastructure components.
3. For metering software.

B. Shop Drawings: For electricity-metering equipment.

1. Include elevation views of front panels of control and indicating devices and control stations.
2. Include diagrams for power, signal, and control wiring.
3. Wire Termination Diagrams and Schedules: Include diagrams for power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.
4. Include series-combination rating data for modular meter centers with main disconnect device.
5. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices used. Describe characteristics of network and other data communication lines.
6. Submit evidence that meters are compatible with connected monitoring and control devices and systems specified in Section 260913 "Electrical Power Monitoring and Control."

    a. Show interconnecting signal and control wiring, and interface devices to show compatibility of meters.
    b. For reporting and billing interfaces and adapters, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the protocol.

C. Field quality-control reports.

1.7 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Installation of metering equipment.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that metering equipment performs in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Initial Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

B. Comply with UL 916.

2.2 UTILITY METERING INFRASTRUCTURE

A. Install metering accessories furnished by utility company, complying with its requirements.

B. Utility-Furnished Meters: Connect data transmission facility of metering equipment installed by Utility.

1. Data Transmission: Transmit pulse data over control-circuit conductors, classified as Class 1 per NFPA 70, Article 725.

C. Current-Transformer Cabinets: Comply with requirements of electrical-power utility company.

D. Meter Sockets:

1. Comply with requirements of electrical-power utility company.
2. Steady-state and short-circuit current ratings must meet indicated circuit ratings.

E. Arc-Flash Warning Labels;

1. Comply with requirements for "Arc-Flash Warning Labels" in Section 260573.19 "Arc-Flash Studies." Apply 3-1/2-by-5 inch thermal transfer label of high-adhesion polyester for each work location included in the analysis.

2.3 ELECTRICITY METERS

A. System Description: Able to meter designated activity loads, with or without external alarm, control, and communication capabilities, or other optional features.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Davidge Controls.
3. Eaton.
4. E-Mon.
5. GE Power; General Electric Company.
6. Leviton Manufacturing Co., Inc.
7. National Meter Industries.
8. Sensus Metering Systems.
9. Siemens Industry, Inc., Energy Management Division.
10. Square D; Schneider Electric USA.
11. Or approved equal.

C. General Requirements for Meters:

1. Comply with NEMA ANSI C12.1 and NEMA ANSI C12.20, 0.5 accuracy class.
2. Ambient Temperature: Minus 22 deg F to plus 158 deg F.
3. Humidity: Zero to 95 percent, noncondensing.
4. Capacities and Characteristics:

    a. Circuit: 120/240 V(ac), 100 A.
    b. Measure: kWh, onboard LED display.
    c. Remote-Reading Options: None.
5. Certify that meters comply with NEMA ANSI C12.20 requirements by laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology (NIST). Laboratory must use test equipment that is certified annually and is traceable to NIST standards.
6. Enclosure: Supplied by meter manufacturer, UL 50E, Type 1 minimum, with provisions for locking or sealing.
7. Identification: Comply with requirements in Section 260553 "Identification for Electrical Systems."
8. Onboard Nonvolatile Data Storage: kWh, until reset.
9. Sensors: Current-sensing type, supplied by electronic meter manufacturer, with current or voltage output, selected for optimum range and accuracy for meters indicated for this application.

    a. Type: solid core, complying with recommendation of meter manufacturer.

D. kWhd Meter: Electronic three-phase meters, measuring electricity use and demand. Demand must be integrated over 15-minute interval.

1. Voltage and Phase Configuration: Meter must be designed for use on circuits with voltage rating and phase configuration indicated for its application.
2. Display: LCD with characters not less than 0.25 inch high, indicating the following:

    a. Accumulative kWh.
    b. Current time and date.
    c. Current demand.
    d. Historic peak demand.
    e. Time and date of historic peak demand.

3. Retain accumulated kWh and historic peak demand in nonvolatile memory, until reset.

E. Current-Transformer Cabinet: Size and configuration as recommended by metering equipment manufacturer for use with indicated connected feeder and sensors.

F. Software: PC-based product recommended by meter manufacturer, suitable for calculating utility cost allocation.

1. Utility Cost Allocation: Automatically import electricity-usage records to allocate electricity costs for the following:

a. At least 15 departments.
b. At least 30 tenants or activities.
c. At least five processes.
d. At least five buildings.

2. Activity Billing Software: Automatically import electricity-usage records to automatically compute and prepare electricity-use statements and invoices based on electricity use and peak demand. Maintain separate directory for each allocation. Prepare summary reports in user-defined formats and time intervals.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Install modular meter center according to switchboard installation requirements in NECA 400.
2. Install arc-flash labels as required by NFPA 70.

C. Special Techniques:

1. Install meters furnished by utility company. Install raceways and equipment according to utility company's published instructions. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
2. Wiring Methods:

a. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533.13 "Conduits for Electrical Systems."
b. Install unshielded, twisted-pair cable for control and signal transmission conductors, complying with Section 271513 "Communications Copper Horizontal Cabling."
c. Minimum conduit size is metric designator 16 (trade size 1/2).

3.3 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Series Combination Warning Label: Self-adhesive labels, with text as required by NFPA 70.
2. Equipment Identification Labels: Self-adhesive labels with clear protective overlay. For residential meters, provide additional card holder suitable for printed, weather-resistant card with occupant's name.

3.4 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Equipment and Software Setup:

a. Set meter date and time clock.
b. Test, calibrate, and connect pulse metering system.
c. Set and verify billing demand interval for demand meters.
d. Report settings and calibration results.
e. Set up reporting and billing software, insert billing location names and initial constant values and variable needed for billing computations.

2. Connect load of known power rating, 1.5 kW minimum, to circuit supplied by metered feeder.
3. Turn off circuits supplied by metered feeder and secure them in off condition.
4. Run test load continuously for eight hours minimum, or longer, to obtain measurable meter indication. Use test-load placement and setting that ensures continuous, safe operation.
5. Check and record meter reading at end of test period and compare with actual electricity used, based on test-load rating, duration of test, and sample measurements of supply voltage at test-load connection. Record test results.
6. Generate test report and billing for each tenant or activity from meter reading tests.

C. Nonconforming Work:

1. Electricity metering will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.5 PROTECTION

A. After installation, protect metering equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 262713

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. General-use switches, dimmer switches, and fan-speed controller switches.
2. General-grade duplex straight-blade receptacles.
3. Connectors, cords, and plugs.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260923 "Lighting Control Devices" for occupancy sensors, timers, control-voltage switches, and control-voltage dimmers.
4. Section 262726.11 "General-Use Switches, Dimmer Switches, and Fan-Speed Controller Switches" for additional wiring device products.
5. Section 262726.33 "General-Grade Duplex Straight-Blade Receptacles" for additional wiring device products.
6. Section 262726.37 "Receptacles with Arc-Fault and Ground-Fault Protective Devices" for additional wiring device products.
7. Section 262726.51 "Connectors, Cords, and Plugs" for additional wiring device products.

1.3 DEFINITIONS

A. Commercial/Industrial-Use Cord Reel: A cord reel subject to severe use in factories, commercial garages, construction sites, and similar locations requiring a harder service-type cord.

B. UL 1472 Type I Dimmer: Dimmer in which air-gap switch is used to energize preset lighting levels.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Toggle switches.
2. Key lock switches.
3. Maintained-contact switches.
4. Momentary-contact switches.
5. Rocker switches.
6. Dimmer switches.
7. Fan-speed controllers.
8. Single straight-blade receptacles
9. Duplex straight-blade receptacles.
10. Duplex straight-blade receptacles with integral switching means.
11. Hospital-grade straight-blade receptacles.
12. Receptacles with AFCI device.
13. Receptacles with AFCI and GFCI devices.
14. Receptacles with GFCI device.
15. Locking receptacles.
16. Pin-and-sleeve receptacles.
17. Spring-driven commercial/industrial-use cord reels.
18. Cord reels for use in hazardous locations.
19. Cord connectors.

B. Shop Drawings:

1. Wiring diagrams for duplex straight-blade receptacles with integral switching means.

C. Samples:

1. One for each kind of toggle switch and cover plate accessory specified, in each finish and color specified.
2. One for each kind of key lock switch and cover plate accessory specified, in each finish and color specified.
3. One for each kind of maintained-contact switch and cover plate accessory specified, in each finish and color specified.
4. One for each kind of momentary-contact switch and cover plate accessory specified, in each finish and color specified.
5. One for each kind of rocker switch and cover plate accessory specified, in each finish and color specified.
6. One for each kind of dimmer switch and cover plate accessory specified, in each finish and color specified.
7. One for each kind of fan-speed controller switch and cover plate accessory specified, in each finish and color specified.
8. One for each kind of single straight-blade receptacle and cover plate accessory specified, in each finish and color specified.
9. One for each kind of duplex straight-blade receptacle and cover plate accessory specified, in each finish and color specified.

10. One for each kind of duplex straight-blade receptacle with integral switching means and cover plate accessory specified, in each finish and color specified.
11. One for each kind of hospital-grade straight-blade receptacle and cover plate accessory specified, in each finish and color specified.
12. One for each kind of receptacle with AFCI device and cover plate accessory specified, in each finish and color specified.
13. One for each kind of receptacle with AFCI and GFCI devices and cover plate accessory specified, in each finish and color specified.
14. One for each kind of receptacle with GFCI device and cover plate accessory specified, in each finish and color specified.
15. One for each kind of locking receptacle and cover plate accessory specified, in each finish and color specified.
16. One for each kind of pin-and-sleeve receptacle specified, in each finish and color specified.
17. One for each kind of cord connector specified, in each finish and color specified.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Dimmers.
2. Fan-speed controllers.
3. Single straight-blade receptacles.
4. Duplex straight-blade receptacles.
5. Duplex straight-blade receptacles with integral switching means.
6. Hospital-grade straight-blade receptacles.
7. Receptacles with AFCI device.
8. Receptacles with AFCI and GFCI devices.
9. Receptacles with GFCI device.
10. Locking receptacles.
11. Pin-and-sleeve receptacles.
12. Spring-driven commercial/industrial-use cord reels.
13. Cord reels for use in hazardous locations.

1.7 CLOSEOUT SUBMITTALS

A. Sustainable Design Closeout Documentation:

1. Record floor plan drawings showing as-installed locations of switches and dimmers, indicating lighting zones each device controls, to verify extent of ability of installed Work to provide occupant control for customizing environment.

2. Record floor plan drawings showing as-installed locations of uncontrolled and marked controlled receptacles superimposed on office furniture layout, to verify extent of ability of installed Work to provide each occupant ability to select at least one uncontrolled receptacle and at least one controlled receptacle for powering workspace equipment. Show locations of UL-approved relocatable power taps and power strips, indicating means of securing for protection from damage and accessibility for inspection. Show locations of temporary extension cords, indicating plan for replacing them with permanent wiring within 90 days.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY FOR DEVICES

A. Manufacturer Warranty: Manufacturer warrants that devices perform in accordance with specified requirements and agrees to provide repair or replacement of devices that fail to perform as specified within warranty period.

1. Warranty Period: Five years from date of Substantial Completion; prorated coverage for labor, materials, and equipment.

1.10 WARRANTY FOR CORD REELS

A. Manufacturer Warranty: Manufacturer warrants that components of cord-reel power outlet assemblies perform in accordance with specified requirements and agrees to provide repair or replacement of components that fail to perform as specified within warranty period.

1. Warranty Period: Five years from date of Substantial Completion; prorated coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 GENERAL-USE SWITCHES, DIMMER SWITCHES, AND FAN-SPEED CONTROLLER SWITCHES

A. Toggle Switch :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
e. Or approved equal.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

3. General Characteristics:

a. Reference Standards: UL CCN WMUZ and UL 20.

4. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration:

1) General-duty, 120-277 V, 20 A, single pole.

5. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

B. Rocker Switch :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
e. Or approved equal.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

3. General Characteristics:

a. Reference Standards: UL CCN WMUZ and UL 20.

4. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration:

1) 120-277 V, 20 A, single pole.

5. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

2.2 GENERAL-GRADE DUPLEX STRAIGHT-BLADE RECEPTACLES

A. Duplex Straight-Blade Receptacle :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
e. Or approved equal.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

3. General Characteristics:

a. Reference Standards: UL CCN RTRT and UL 498.

4. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration:

1) General-duty, NEMA 5-20R.

5. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

2.3 CONNECTORS, CORDS, AND PLUGS

A. Outdoor-Use, Watertight, Sealed Cord Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ericson Manufacturing Company.
b. Hubbell Incorporated, Commercial and Industrial.
c. Legrand North America, LLC.
d. Or approved equal.

2. Regulatory Requirements:

   a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

3. General Characteristics:

   a. Reference Standards: UL CCN AXUT and UL 498.

4. Options:

   a. Configuration:

      1) NEMA 5-20 with diagnostic LED indicator.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Receptacles:

1. Verify that receptacles to be procured and installed for City of New York-furnished equipment are compatible with mating attachment plugs on equipment.

B. Cord Reels:

1. Examine roughing-in for cord reel mounting and power connections to verify actual locations of mounts and power connections before cord reel installation.
2. Examine walls, floors, and ceilings for suitable conditions where cord reel will be installed.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SELECTION OF CONTROLLED AND UNCONTROLLED RECEPTACLES

A. Private and Open Office Spaces:

1. Uncontrolled Receptacles at Workstations: Coordinate final locations of receptacles with furniture plan such that at least one uncontrolled receptacle is selected for installation not greater than 6 ft from each workstation.
2. Controlled Receptacles at Workstations: Coordinate final locations of receptacles with furniture plan such that at least one controlled receptacle is selected for installation not greater than 6 ft from each workstation.

B. Contact Commissioner for resolution of discrepancies between these requirements and Drawings

3.4 INSTALLATION OF SWITCHES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

    a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black white or red-filled lettering, and provide durable wire markers or tags inside device box or outlet box.
    b. Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

3.5 INSTALLATION OF STRAIGHT-BLADE RECEPTACLES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

    a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black white or red-filled lettering, and provide durable wire markers or tags inside device box or outlet box.
    b. Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

3.6 INSTALLATION OF LOCKING RECEPTACLES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black, white orred-filled lettering, and provide durable wire markers or tags inside device box or outlet box.
b. Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

3.7 INSTALLATION OF PIN-AND-SLEEVE RECEPTACLES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in UL 1686.
4. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black, white, or red-filled lettering, and provide durable wire markers or tags inside device box or outlet box.
b. Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

3.8 INSTALLATION OF CORD REELS AND FITTINGS

A. Comply with manufacturer's instructions.

3.9 INSTALLATION OF CONNECTORS, CORDS, AND PLUGS

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Consult Commissioner for resolution of conflicting requirements.

3.10 FIELD QUALITY CONTROL OF SWITCHES

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform tests and inspections in accordance with manufacturers' instructions.

C. Nonconforming Work:

1. Unit will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to supervise field tests and inspections.

3.11 FIELD QUALITY CONTROL OF STRAIGHT-BLADE RECEPTACLES

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Insert and remove test plug to verify that device is securely mounted.
2. Verify polarity of hot and neutral pins.
3. Measure line voltage.
4. Measure percent voltage drop.
5. Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
6. Test straight-blade receptacles in patient care spaces with receptacle pin tension test instrument in accordance with NFPA 99. Retention force of ground pin must be not less than 115 g (4 oz).
7. Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.

C. Nonconforming Work:

1. Device will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.12 FIELD QUALITY CONTROL OF CORD REELS AND FITTINGS

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform tests and inspections indicated in manufacturer's instructions.

C. Nonconforming Work:

1. Components and assemblies will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.13 FIELD QUALITY CONTROL OF CONNECTORS, CORDS, AND PLUGS

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform tests and inspections indicated in manufacturer's instructions.

C. Nonconforming Work:

1. Unit will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.14 SYSTEM STARTUP FOR SWITCHES

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks for momentary switches, dimmer switches, and fan-speed controller switches in accordance with manufacturer's instructions.

3.15 ADJUSTING

A. Occupancy Adjustments for Controlled Receptacles: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

B. Cord Reels and Fittings: Adjust spring mechanisms and moving parts of cord reels and fittings to function smoothly, and lubricate as recommended in writing by manufacturer.

3.16 PROTECTION

A. Devices:

1. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.
2. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

B. Cord Reels and Fittings:

1. After installation, protect cord reels and fittings from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the Commisioner.

C. Connectors, Cords, and Plugs:

1. After installation, protect connectors, cords, and plugs from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the Commissioner.

END OF SECTION 262726

SECTION 262726.11 - GENERAL-USE SWITCHES, DIMMER SWITCHES, AND FAN-SPEED CONTROLLER SWITCHES

PART 1 - GENERAL

1.1 Related Documents

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. General-use switches.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260923 "Lighting Control Devices" for occupancy sensors, timers, control-voltage switches, and control-voltage dimmers.

1.3 DEFINITIONS

A. UL 1472 Type I Dimmer: Dimmer in which air-gap switch is used to energize preset lighting levels.

B. UL 1472 Type II Dimmer: Dimmer with air-gap switch that opens and closes load circuit at minimum output voltage setting only.

C. UL 1472 Type IIa Dimmer: Dimmer with air-gap switch that opens and closes load circuit at maximum output voltage setting only.

D. UL 1472 Type III Dimmer: Dimmer incorporating solid-state components providing preestablished rectified output settings.

E. UL 1472 Type IV Dimmer: Dimmer not covered by UL 1472 Types I through III.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Toggle switches.
2. Key lock switches.
3. Maintained-contact switches.
4. Momentary-contact switches.
5. Rocker switches.
6. Dimmer switches.
7. Fan-speed controllers.

B. Field Quality-Control Submittals:

1. Field quality-control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Dimmers.
2. Fan-speed controllers.

1.7 CLOSEOUT SUBMITTALS

A. Sustainable Design Closeout Documentation:

1. Record floor plan drawings showing as-installed locations of switches and dimmers, indicating lighting zones each device controls, to verify extent of ability of installed Work to provide occupant control for customizing environment.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 GENERAL-USE SWITCHES

A. Description: Snap switches intended for mounting in device boxes.

B. Performance Criteria:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. General Characteristics:

    a. Reference Standards: UL CCN WMUZ and UL 20.

C. Toggle Switch :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour; Legrand North America, LLC.
    d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
    e. Or approved equal.

2. Options:

    a. Device Color: As indicated on architectural Drawings.
    b. Configuration:

        1) General-duty, 120-277 V, 20 A, single pole.

3. Accessories:

    a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
    b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

D. Rocker Switch :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour; Legrand North America, LLC.
    d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
    e. Or approved equal.

2. Options:

    a. Device Color: As indicated on architectural Drawings.
    b. Configuration:

        1) 120-277 V, 20 A, single pole.

3. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black white red-filled lettering, and provide durable wire markers or tags inside device box or outlet box.
b. Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

3.3 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform tests and inspections in accordance with manufacturers' instructions.

C. Nonconforming Work:

1. Unit will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.4 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks for momentary switches, dimmer switches, and fan-speed controller switches in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.

B. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the Commissioner.

END OF SECTION 262726.11

SECTION 262726.33 - GENERAL-GRADE DUPLEX STRAIGHT-BLADE RECEPTACLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 262726.37 "Receptacles with Arc-Fault and Ground-Fault Protective Devices" for AFCI and GFCI receptacles.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Duplex straight-blade receptacles.
2. Duplex straight-blade receptacles with integral switching means.

B. Shop Drawings:

1. Wiring diagrams for duplex straight-blade receptacles with integral switching means.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Duplex straight-blade receptacles.
2. Duplex straight-blade receptacles with integral switching means.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify that receptacles to be procured and installed for City of New York-furnished equipment are compatible with mating attachment plugs on equipment.

3.3 SELECTION OF CONTROLLED AND UNCONTROLLED RECEPTACLES

A. Private and Open Office Spaces:

1. Uncontrolled Receptacles at Workstations: Coordinate final locations of receptacles with furniture plan such that at least one uncontrolled receptacle is selected for installation not greater than 6 ft from each workstation.
2. Controlled Receptacles at Workstations: Coordinate final locations of receptacles with furniture plan such that at least one controlled receptacle is selected for installation not greater than 6 ft from each workstation.
3. Contact Commissioner for resolution of discrepancies between these requirements and Drawings.

3.4 INSTALLATION

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.

4. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

D. Interfaces with Other Work:

1. Do not install Type 3 SPD, including surge-protected relocatable taps and power strips, on branch circuit downstream of GFCI device.

3.5 ADJUSTING

A. Occupancy Adjustments for Controlled Receptacles: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.6 PROTECTION

A. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.

B. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the Commissioner.

END OF SECTION 262726.33

SECTION 262726.37 - RECEPTACLES WITH ARC-FAULT AND GROUND-FAULT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Receptacles with GFCI devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 262726.33 "General-Grade Duplex Straight-Blade Receptacles" for duplex receptacles that are not hospital grade.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Receptacles with GFCI devices.

B. Samples:

1. One for each kind of receptacles with GFCI devices and cover plate accessory specified, in each finish and color specified.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Receptacles with GFCI devices.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 RECEPTACLES WITH GFCI DEVICES

A. Description: Receptacles containing GFCI device for use in accordance with NFPA 70.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. General Characteristics:

a. Reference Standards: UL CCN KCXS, UL 498, and UL 943.

C. General-Grade Duplex Straight-Blade Receptacle with GFCI Device :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
e. Or approved equal.

2. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration: Heavy-duty, NEMA 5-20R.

3. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

D. General-Grade, Weather-Resistant Duplex Straight-Blade Receptacle with GFCI Device :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
e. Or approved equal.

2. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration: Heavy-duty, NEMA 5-20R.

3. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify that receptacles to be procured and installed for City of New York-furnished equipment are compatible with mating attachment plugs on equipment.

3.3 INSTALLATION

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.

3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black white or red-filled lettering, and provide durable wire markers or tags inside device box or outlet box.

D. Interfaces with Other Work:

1. Do not install Type 3 SPD, including surge-protected relocatable taps and power strips, on branch circuit downstream of GFCI device.

3.4 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Insert and remove test plug to verify that device is securely mounted.
2. Verify polarity of hot and neutral pins.
3. Measure line voltage.
4. Measure percent voltage drop.
5. Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
6. Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.

C. Nonconforming Work:

1. Device will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.5 PROTECTION

A. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.

B. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the Commissioner.

END OF SECTION 262726.37

SECTION 262726.51 - CONNECTORS, CORDS, AND PLUGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Fuseless attachment cord connectors.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Fuseless attachment cord connectors.
2. Extra-hard-usage, jacketed, flexible cord.
3. Antimicrobial, extra-hard-usage, jacketed, flexible cord.
4. Hard-usage, jacketed, flexible cord.
5. Strain-relief cord grips.

B. Samples:

1. One for each kind of cord connector specified, in each finish and color specified.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 FUSELESS ATTACHMENT CORD CONNECTORS

A. Description: Connectors for attachment to cord that do not incorporate switches or overcurrent protection.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

2. General Characteristics:

a. Reference Standards: UL CCN AXUT and UL 498.

C. Indoor-Use, Dry Location Cord Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ericson Manufacturing Company.
b. Hubbell Electrical Solutions.
c. Belden Cables.
d. Or approved equal.

2. Options:

a. Configuration: NEMA 5-15.

D. Indoor-Use, Sealed Cord Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ericson Manufacturing Company.
b. Hubbell Electrical Solutions.
c. Belden Cables
d. Or approved equal.

2. Options:

a. Configuration:

1) NEMA 5-20 with diagnostic LED indicator.

E. Indoor-Use, Compression-Grip, Sealed Cord Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ericson Manufacturing Company.
b. Hubbell Electrical Solutions.
c. Belden Cables.
d. Or approved equal.

2. Options:

a. Configuration:

1) NEMA 5-20 with diagnostic LED indicator.

F. Outdoor-Use, Watertight, Sealed Cord Connector :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ericson Manufacturing Company.
b. Hubbell Electrical Solutions.
c. Belden Cables.
d. Or approved equal.

2. Options:

a. Configuration:

1) NEMA 5-20 with diagnostic LED indicator.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Consult Commissioner for resolution of conflicting requirements.

3.3 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform tests and inspections indicated in manufacturer's instructions.

C. Nonconforming Work:

1. Unit will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.4 PROTECTION

A. After installation, protect connectors, cords, and plugs from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the Commissioner.

END OF SECTION 262726.51

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:

    a. Control circuits.
    b. Panelboards.
    c. Switchboards.
    d. Enclosed controllers.
    e. Enclosed switches.

2. Spare-fuse cabinets.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

    a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
    b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.

4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit in electronic format suitable for use in coordination software and in PDF format.
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to requirements per DDC General Conditions, include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse used on the Project. Submit in electronic format suitable for use in coordination software and in PDF format.
4. Coordination charts and tables and related data.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 FIELD CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bussmann, an Eaton business.
2. Edison; a brand of Bussmann by Eaton.
3. Littelfuse, Inc.
4. Mersen USA.
5. Or approved equal.

B. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. Type RK-1: 250 -V, zero- to 600-A rating, 200 kAIC.
2. Type RK-5: 250 -V, zero- to 600-A rating, 200 kAIC.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

2.3 SPARE-FUSE CABINET

A. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.

1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
2. Finish: Gray, baked enamel.
3. Identification: "SPARE FUSES" in 1-1/2-inch- high letters on exterior of door.
4. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance: Class RK1, time delay.
2. Feeders: Class RK1, time delay.
3. Motor Branch Circuits: Class RK5, time delay.
4. Large Motor Branch (601-4000 A): Class L, time delay.
5. Power Electronics Circuits: Class J, high speed.
6. Other Branch Circuits: Class RK1, time delay or Class RK5, time delay .
7. Control Transformer Circuits: Class CC, time delay, control transformer duty.
8. Provide open-fuse indicator fuses or fuse covers with open fuse indication.

3.4 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

B. Install spare-fuse cabinet(s) in location shown on the Drawings or as indicated in the field by Commissioner.

3.5 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262923 - VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes separately enclosed, preassembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

1.3 DEFINITIONS

A. CPT: Control power transformer.

B. EMI: Electromagnetic interference.

C. LED: Light-emitting diode.

D. NC: Normally closed.

E. NO: Normally open.

F. OCPD: Overcurrent protective device.

G. PID: Control action, proportional plus integral plus derivative.

H. RFI: Radio-frequency interference.

I. VFC: Variable-frequency motor controller.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type and rating of VFC indicated.

1. Include dimensions and finishes for VFCs.

2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each VFC indicated.

1. Include mounting and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Required working clearances and required area above and around VFCs.
2. Show VFC layout and relationships between electrical components and adjacent structural and mechanical elements.
3. Show support locations, type of support, and weight on each support.
4. Indicate field measurements.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Seismic Qualification Data: Certificates, for each VFC, accessories, and components, from manufacturer.

1. Certificate of compliance.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based, and their installation requirements.

C. Product Certificates: For each VFC from manufacturer.

D. Harmonic Analysis Report: Provide Project-specific calculations and manufacturer's statement of compliance with IEEE 519.

E. Source quality-control reports.

F. Field quality-control reports.

G. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals.

1. In addition to closeout requirements per DDC General Conditions, include the following:

a. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and motor-circuit protector trip settings.
b. Manufacturer's written instructions for setting field-adjustable overload relays.
c. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
d. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
e. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate, full-load currents.
f. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Agency Qualifications: Accredited by NETA.

1.9 DELIVERY, STORAGE, AND HANDLING

A. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers and connect factory-installed space heaters to temporary electrical service.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB Low Voltage HVAC Drives.
2. Cerus Industrial, Inc.
3. Danfoss Inc.
4. Eaton.

5. Emerson Industrial Automation.
6. General Electric Company.
7. Rockwell Automation, Inc.
8. Schneider Electric USA, Inc.
9. SIEMENS Industry, Inc.; Energy Management Division.
10. Yaskawa Electric America, Inc.
11. Or approved equal.

2.2 SYSTEM DESCRIPTION

A. General Requirements for VFCs:

1. VFCs and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508A.

B. Application: Constant torque and variable torque.

C. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

D. Unit Operating Requirements:

1. Input AC Voltage Tolerance: Plus 10 and minus 10 percent of VFC input voltage rating.
2. Input AC Voltage Unbalance: Not exceeding 3 percent.
3. Minimum Efficiency: 97 percent at 60 Hz, full load.
4. Minimum Displacement Primary-Side Power Factor: 98 percent under any load or speed condition.
5. Minimum Short-Circuit Current (Withstand) Rating: 22 kA.
6. Ambient Temperature Rating: Not less than 32 deg F and not exceeding 104 deg F.
7. Humidity Rating: Less than 95 percent (noncondensing).
8. Vibration Withstand: Comply with NEMA ICS 61800-2.
9. Overload Capability: 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.

E. Inverter Logic: Microprocessor based, 32 bit, isolated from all power circuits.

F. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.

1. Signal: Pneumatic.

G. Internal Adjustability Capabilities:

1. Minimum Speed: 5 to 25 percent of maximum rpm.
2. Maximum Speed: 80 to 100 percent of maximum rpm.
3. Acceleration: 0.1 to 999.9 seconds.
4. Deceleration: 0.1 to 999.9 seconds.

H. Self-Protection and Reliability Features:

1. Surge Suppression: Factory installed as an integral part of the VFC, complying with UL 1449 SPD, Type 1 or Type 2.
2. Under- and overvoltage trips.
3. Inverter overcurrent trips.
4. VFC and Motor-Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
5. Critical frequency rejection, with three selectable, adjustable deadbands.
6. Instantaneous line-to-line and line-to-ground overcurrent trips.
7. Loss-of-phase protection.
8. Reverse-phase protection.
9. Short-circuit protection.
10. Motor-overtemperature fault.

I. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.

J. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.

K. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.

L. Integral Input Disconnecting Means and OCPD: UL 489, instantaneous-trip circuit breaker with pad-lockable, door-mounted handle mechanism.

1. Disconnect Rating: Not less than 115 percent of VFC input current rating.
2. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.
3. Auxiliary contacts "a" and "b" arranged to activate with circuit-breaker handle.
4. NC alarm contact that operates only when circuit breaker has tripped.

2.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: VFCs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. The designated VFCs shall be tested and certified by an NRTL as meeting the ICC-ES AC 156 test procedure requirements.

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 CONTROLS AND INDICATION

A. Status Lights: Door-mounted LED indicators displaying the following conditions:

1. Power on.

2. Run.
3. Overvoltage.
4. Line fault.
5. Overcurrent.
6. External fault.

B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.

1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.

C. Control Signal Interfaces:

1. Electric Input Signal Interface:

a. A minimum of two programmable analog inputs: .
b. A minimum of six multifunction programmable digital inputs.

2. Output Signal Interface: A minimum of one programmable analog output signal(s), which can be configured for any of the following:

a. Output frequency (Hz).
b. Output current (load).
c. DC-link voltage (V dc).
d. Motor torque (percent).
e. Motor speed (rpm).
f. Set point frequency (Hz).

3. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:

a. Motor running.
b. Set point speed reached.
c. Fault and warning indication (overtemperature or overcurrent).
d. PID high- or low-speed limits reached.

D. Interface with Direct digital control System for HVAC: Factory-installed hardware and software must interface with Direct digital control system for HVAC to monitor, control, display, and record data for use in processing reports. VFC settings must be retained within VFC's nonvolatile memory.

1. Hardwired Points:

a. Control: On-off operation.

2.5 BYPASS SYSTEMS

A. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes and indicator lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.

B. Bypass Mode: Manual operation only; requires local operator selection at VFC. Transfer between power converter and bypass contactor, and retransfer must only be allowed with the motor at zero speed.

C. Bypass Mode: Field-selectable automatic or manual, allows local and remote transfer between power converter and bypass contactor and retransfer, either via manual operator interface or automatic-control system feedback.

D. Bypass Controller: Three-contactor-style bypass allows motor operation via the power converter or the bypass controller arranged to isolate the power converter input and output and permit safe testing and troubleshooting of the power converter, both energized and de-energized, while motor is operating in bypass mode.

1. Bypass Contactor: Load-break, NEMA-rated contactor.
2. Input and Output Isolating Contactors: Non-load-break, NEMA-rated contactors.
3. Isolating Switch: Non-load-break switch arranged to isolate power converter and permit safe troubleshooting and testing of the power converter, both energized and de-energized, while motor is operating in bypass mode; pad-lockable, door-mounted handle mechanism.

E. Bypass Contactor Configuration: Full-voltage (across-the-line) type.

1. NORMAL/BYPASS selector switch.
2. HAND/OFF/AUTO selector switch.
3. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.

    a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.

4. Control Circuits: 120-V ac; obtained from , with of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices.

    a. CPT Spare Capacity: 50 VA.

2.6 OPTIONAL FEATURES

A. Damper control circuit with end-of-travel feedback capability.

B. Firefighter's Override (Smoke Purge) Input: On a remote contact closure from the firefighter's control station smoke-control fan controller, this password-protected input:

1. Overrides all other local and external inputs (analog/digital, serial communication, and all keypad commands).

2. Forces VFC to operate motor, without any other run or speed command, at a field-adjustable, preset speed.
3. Forces VFC to transfer to bypass mode and operate motor at full speed.
4. Causes display of override mode on the VFC display.
5. Reset VFC to normal operation on removal of override signal automatically.

C. Remote digital operator kit.

D. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of connecting a printer.

2.7 ENCLOSURES

A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.

1. Dry and Clean Indoor Locations: Type 1.
2. Outdoor Locations: Type 3R.
3. Areas: Type 4X, .
4. Other Wet or Damp Indoor Locations: Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.

2.8 ACCESSORIES

A. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in VFC enclosure cover unless otherwise indicated.

1. Push Buttons: Shielded.
2. Pilot Lights: Push to test.
3. Selector Switches: Rotary type.

B. Reversible NC/NO bypass contactor auxiliary contact(s).

C. Control Relays: Auxiliary and adjustable solid-state time-delay relays.

D. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.

1. Current Transformers: Continuous current rating, basic impulse insulating level (BIL) rating, burden, and accuracy class suitable for connected circuitry. Comply with IEEE C57.13.

E. Supplemental Digital Meters:

1. Elapsed-time meter.
2. Kilowatt meter.
3. Kilowatt-hour meter.

F. Breather and drain assemblies, to maintain interior pressure and release condensation in NEMA 250, Type 4 enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.

G. Space heaters, with NC auxiliary contacts, to mitigate condensation in NEMA 250, Type 3R enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.

H. Cooling Fan and Exhaust System: For NEMA 250, Type 1; UL 508 component recognized: Supply fan, with intake and exhaust grills ; -V ac; obtained from .

I. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.

J. Spare control-wiring terminal blocks; wired.

2.9 SOURCE QUALITY CONTROL

A. Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.

1. Test each VFC while connected to its specified motor.

B. VFCs will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.

B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Wall-Mounting Controllers: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

B. Floor-Mounting Controllers: Install VFCs on 4-inch nominal thickness concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Roof-Mounting Controllers: Install VFC on roofs with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished roof surface unless otherwise indicated, and by bolting units to curbs or mounting on freestanding, lightweight, structural-steel channels bolted to curbs. Seal roof penetrations after raceways are installed.

1. Curbs and roof penetrations are specified in Section 077200 "Roof Accessories."
2. Structural-steel channels are specified in Section 260529 "Hangers and Supports for Electrical Systems."

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in each fusible-switch VFC.

F. Install fuses in control circuits if not factory installed. Comply with requirements in Section 262813 "Fuses."

G. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors are installed.

H. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.

I. Comply with NECA 1.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between VFCs and remote devices and facility's central-control system.

B. Bundle, train, and support wiring in enclosures.

C. Connect selector switches and other automatic-control devices where applicable.

1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.5 IDENTIFICATION

A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each VFC with engraved nameplate.
3. Label each enclosure-mounted control and pilot device.

B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Acceptance Testing Preparation:

1. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

E. Tests and Inspections:

1. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at VFC locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Commissioner before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Perform the following infrared (thermographic) scan tests and inspections, and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each VFC. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each VFC 11 months after date of Substantial Completion.
    c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

9. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

F. VFCs will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.7 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.8 ADJUSTING

A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

C. Adjust the trip settings of instantaneous-only circuit breakers and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to 6 times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed 8 times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Commssioner before increasing settings.

D. Set the taps on reduced-voltage autotransformer controllers.

E. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

F. Set field-adjustable pressure switches.

3.9 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.

B. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.10 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate VFCs.

END OF SECTION 262923

SECTION 262933 - CONTROLLERS FOR FIRE PUMP DRIVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Limited-service controllers.
2. Controllers for pressure-maintenance pumps.
3. Remote alarm panels.
4. Enclosures.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 DEFINITIONS

A. ECM: Electronic control module.

B. MCCB: Molded-case circuit breaker.

C. PID: Proportional integral derivative.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each type of product indicated.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Show tabulations of the following:

    a. Each installed unit's type and details.
    b. Enclosure types and details for types other than NEMA 250, Type 2.
    c. Factory-installed devices.
    d. Nameplate legends.
    e. Short-circuit current (withstand) rating of integrated unit.
    f. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices.
    g. Specified modifications.

4. Include diagrams for power, signal, alarm, control wiring, and pressure-sensing tubing.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product indicated, from manufacturer.

B. Source quality-control reports.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Source Limitations: Obtain fire-pump controllers and associated equipment from single source or producer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 20.

B. IEEE Compliance: Fabricate and test enclosed controllers in accordance with IEEE 344 to withstand seismic forces.

C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory, and marked for intended location and application.

2.2 LIMITED-SERVICE CONTROLLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aquarius Fluid Products, Inc.
2. ASCO: a brand of Vertiv.
3. Eaton.
4. Hubbell Incorporated.
5. Hubbell Industrial Controls; Hubbell Incorporated, Commercial and Industrial.
6. Joslyn Clark Corporation.
7. Master Control Systems, Inc.
8. Tornatech.
9. Or approved equal.

B. General Requirements for Limited-Service Controllers:

1. Comply with NFPA 20 and UL 218.
2. Combined automatic and nonautomatic operation.
3. Factory assembled, wired, and tested; continuous-duty rated.

C. Method of Starting:

1. Pressure-switch actuated.

    a. Water-pressure-actuated switch and pressure transducer with independent high- and low-calibrated adjustments responsive to water pressure in fire-suppression piping.
    b. System pressure recorder, electric ac driven, with spring backup.
    c. Programmable minimum-run-time relay to prevent short cycling.
    d. Programmable timer for weekly tests.

2. Across-the-line magnetic controller.
3. Emergency Start: Mechanically operated start handle that closes and retains the motor RUN contactor independent of electric or pressure actuators.

D. Method of Stopping: Automatic and nonautomatic shutdown after automatic starting.

E. Capacity: Rated for fire-pump-driver horsepower and short-circuit-current (withstand) rating equal to or greater than short-circuit current available at controller location.

F. Method of Isolation and Overcurrent Protection: Inverse-time, nonadjustable MCCB, with an externally mounted operating handle.

G. Door-Mounted Operator Interface and Controls:

1. Monitor, display, and control the devices, alarms, functions, and operations listed in NFPA 20 as required for drivers and controller types used.
2. Method of Control and Indication:

    a. Microprocessor-based logic controller, with multiline LCD digital readout.
    b. Membrane keypad.
    c. LED alarm and status indicating lights.

3. Audible alarm, with silence push button.

4. Nonautomatic START and STOP push buttons.

H. Optional Features:

1. Extra Output Contacts:

a. One NO contact(s) for motor running condition.
b. One set(s) of contacts for loss-of-line power.
c. One each, Form C contacts for high and low reservoir level.

2. Local alarm bell.
3. Door-mounted thermal or impact printer for alarm and status logs.
4. Operator Interface Communications Ports: USB, Ethernet, and TIA-485.

2.3 CONTROLLERS FOR PRESSURE-MAINTENANCE PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aquarius Fluid Products, Inc.
2. ASCO: a brand of Vertiv.
3. Eaton.
4. Hubbell Incorporated.
5. Hubbell Industrial Controls; Hubbell Incorporated, Commercial and Industrial.
6. Joslyn Clark Corporation.
7. Master Control Systems, Inc.
8. Tornatech.
9. Or approved equal.

B. General Requirements for Pressure-Maintenance-Pump Controllers:

1. Type: UL 508, factory-assembled, -wired, and -tested, across-the-line controller; for combined automatic and manual operation.
2. Enclosure: UL 508 and NEMA 250, Type 2 for wall-mounting.
3. Factory assembled, wired, and tested.
4. Finish: Manufacturer's standard color paint.

C. Rate controller for scheduled horsepower and include the following:

1. Fusible disconnect switch.
2. Pressure switch.
3. Hand-off-auto selector switch.
4. Pilot light.
5. Running period timer.

2.4 REMOTE ALARM PANELS

A. General Requirements for Remote Alarm Panels: Factory assembled, wired, and tested; and complying with NFPA 20 and UL 218.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aquarius Fluid Products, Inc.
2. ASCO: a brand of Vertiv.
3. Eaton.
4. Hubbell Incorporated.
5. Hubbell Industrial Controls; Hubbell Incorporated, Commercial and Industrial.
6. Joslyn Clark Corporation.
7. Master Control Systems, Inc.
8. Tornatech.
9. Or approved equal.

C. Supervisory and Normal Control Voltage: 120 V(ac); single source.

D. Audible and Visual Alarm and Status Indications for Electric-Driven Pump Controllers:

1. Driver running.
2. Loss of phase.
3. Phase reversal.
4. Supervised power on.
5. Common trouble on the controller.
6. Controller connected to alternate power source.

E. Audible alarm, with silence push button.

F. Pump REMOTE START push button.

2.5 ENCLOSURES

A. Fire-Pump Controllers, ATS, Remote Alarm Panels, and Low-Suction-Shutdown Panels: NEMA 250, to comply with environmental conditions at installed locations and NFPA 20.

1. Indoor, Dry and Clean Locations: Type 1.

B. Enclosure Color: Manufacturer's standard "fire-pump-controller red".

C. Nameplates: Comply with NFPA 20; complete with capacity, characteristics, approvals, listings, and other pertinent data.

D. Optional Features:

1. Floor stands, 12 inch high, for floor-mounted controllers.
2. Space heater, 120 V(ac) , with humidistat.
3. Tropicalization.

2.6 SOURCE QUALITY CONTROL

A. Testing: Test and inspect fire-pump controllers in accordance with requirements in NFPA 20 and UL 218.

1. Verification of Performance: Rate controllers in accordance with operation of functions and features specified.

B. Fire-pump controllers will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and surfaces to receive equipment, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine equipment before installation. Reject equipment that is wet or damaged by moisture or mold.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF CONTROLLERS

A. Coordinate installation of controllers with other construction including conduit, piping, fire-pump equipment, and adjacent surfaces. Maintain required clearances for workspace and equipment access doors and panels. Ensure that controllers are within sight of fire-pump drivers.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

C. Install controllers within sight of their respective drivers.

D. Connect controllers to their dedicated pressure-sensing lines.

E. Wall-Mounting Controllers: Install controllers on walls with disconnect operating handles not higher than 79 inch above finished floor, and bottom of enclosure not less than 12 inch above finished floor unless otherwise indicated. Bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

F. Floor-Mounting Controllers: Install controllers on concrete base(s), using floor stands high enough so that the bottom of enclosure cabinet is not less than 12 inches above finished floor. Comply with requirements for concrete bases specified in Section 260529 "Hangers and Supports for Electrical Systems."

1. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.

2. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
3. Install anchor bolts to elevations required for proper attachment to supported equipment.

G. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

H. Comply with NEMA ICS 15.

3.4 INSTALLATION OF REMOTE ALARM AND LOW-SUCTION-SHUTDOWN PANELS

A. Install panels on walls with tops not higher than 72 inch above finished floor unless otherwise indicated. Bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For ATS not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

3.5 INSTALLATION OF POWER WIRING

A. Install power wiring between controllers and their services or sources, and between controllers and their drivers. Comply with requirements in NFPA 20, NFPA 70, and Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.6 INSTALLATION OF CONTROL AND ALARM WIRING

A. Install wiring between controllers and remote devices and facility's central monitoring system. Comply with requirements in NFPA 20, NFPA 70.

B. Install wiring between remote alarm and low-suction-shutdown panels and controllers. Comply with requirements in NFPA 20, NFPA 70.

C. Install wiring between controllers and the building's fire-alarm system. Comply with requirements specified in Section 284621.11 "Addressable Fire-Alarm Systems."

D. Bundle, train, and support wiring in enclosures.

E. Connect remote manual and automatic activation devices where applicable.

3.7 IDENTIFICATION

A. Comply with requirements in NFPA 20 for marking fire-pump controllers.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification in NFPA 20 and as specified in Section 260553 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Inspect and Test Each Component:

    a. Inspect wiring, components, connections, and equipment installations. Test and adjust components and equipment.
    b. Test insulation resistance for each element, component, connecting supply, feeder, and control circuits.
    c. Test continuity of each circuit.

2. Verify and Test Each Electric-Drive Controller:

    a. Verify that voltages at controller locations are within plus 10 or minus 1 percent of motor nameplate rated voltages, with motors off. If outside this range for motor, notify Commissioner before starting the motor(s).
    b. Test each motor for proper phase rotation.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Representatives from manufacturers of fire-pump controllers and ATS must be present during acceptance tests and inspections in accordance with NFPA 20.

C. Acceptance tests and inspections must be witnessed by Commissioner.

D. Acceptance Tests and Inspections:

1. Do not begin field acceptance testing until suction piping has been flushed and hydrostatically tested and the certificate for flushing and testing has been submitted to Commissioner.
2. Prior to starting, notify of the time and place of the acceptance testing.
3. Engage manufacturer's factory-authorized service representative to be present during the testing.
4. Perform field acceptance tests as outlined in NFPA 20.

E. Nonconforming Work:

1. Controllers will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

F. Prepare test and inspection reports.

3.9 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.

3.10 ADJUSTING

A. Adjust controllers and battery charger systems to function smoothly and as recommended by manufacturer.

B. Set field-adjustable switches, auxiliary relays, time-delay relays, and timers.

C. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

D. Set field-adjustable pressure switches.

3.11 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature in accordance with manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.

B. Replace controllers whose interiors have been exposed to water or other liquids prior to Substantial Completion.

END OF SECTION 262933

SECTION 263323.11 - CENTRAL BATTERY EQUIPMENT FOR EMERGENCY LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interruptible (slow-transfer) central battery equipment.
2. Enclosures.
3. Optional and accessory features.

1.3 DEFINITIONS

A. Interruptible: As used in the Section Text, an off-line, passive-standby or line-interactive, inverter-only unit, with an intentional interruption of power to the load until an internal transfer switch picks up and transfers the load to the unit's inverter and internal battery source on loss of the "normal" source, and then retransfers to the "normal" source when it is restored. Transfer time can be "slow" (up to approximately 1 second) or "fast" (2-4 ms or 40-50 ms, depending on manufacturer).

B. LED: Light-emitting diode.

C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

D. NiCd: Nickel cadmium.

E. OCPD: Overcurrent protective device.

F. PC: Personal computer.

G. PWM: Pulse-width modulated.

H. TDD: Total demand (harmonic current) distortion (also listed as "THD" in catalog data by manufacturers).

I. THD(V): Total harmonic voltage demand.

J. Uninterruptible: As used in the Section Text, an on-line, double-conversion (rectifier/inverter) unit, with no interruption of power to the load on interruption and restoration of the "normal" source.

K. UPS: Uninterruptible power supply.

L. VRLA: Valve-regulated lead acid.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type and rating of central battery equipment unit.

1. Include features, performance, electrical ratings, operating characteristics, shipping and operating weights, shipping splits, and furnished options, specialties, and accessories.

B. Shop Drawings: For each type and rating of central battery equipment unit.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, ventilation requirements, method of field assembly, components, and location and size of each field connection.
3. Include system one-line diagram, internal and interconnecting wiring; and diagrams for power, signal, and control wiring.
4. Include elevation, details, and legends of control and indication displays.
5. Include -circuit current (withstand) rating of unit.

C. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around central battery equipment. Show central battery equipment layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Seismic Qualification Data: For central battery equipment, accessories, and components, from manufacturer.

1. Certificate of compliance.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Product Certificates: For each type of central battery equipment.

D. Harmonic Analysis Study and Report: Comply with IEEE 399 and NETA Acceptance Testing Specification; identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze designated operating scenarios, including recommendations for input filtering of central battery equipment to limit TDD and THD(V) to specified levels.

E. Source quality-control reports.

F. Field quality-control reports.

G. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For central battery equipment to include in emergency, operation, and maintenance manuals.

1. In addition DDC General Conditions closeout requirements, include the following:

a. Manufacturer's written instructions for testing central battery equipment.
b. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
c. Manufacturer's written instructions for selecting and setting field-adjustable controls and status and alarm points.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

C. Testing Agency Qualifications: Member company of NETA or an NRTL acceptable to NYC Department of Buildings.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in fully enclosed vehicles.

B. Store equipment in spaces having environments controlled within manufacturers' written instructions for ambient temperature and humidity conditions for non-operating equipment.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Less than 0 deg F or exceeding 104 deg F, with an average value exceeding 95 deg F over a 24-hour period.
2. Ambient Storage Temperature: Not less than minus 4 deg F and not exceeding 140 deg F.
3. Humidity: More than 95 percent (condensing).
4. Altitude: Exceeding 3300 feet.

B. Interruption of Existing Electrical Distribution Systems: Do not interrupt electrical distribution systems within facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of electrical systems.
2. Indicate method of providing temporary electrical service.
3. Do not proceed with interruption of electrical systems without Commissioner's written permission.
4. Comply with NFPA 70E.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for central battery equipment, including clearances between central battery equipment and adjacent surfaces and other items.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace central battery equipment that fails in materials or workmanship within specified warranty period. Special warranty, applying to batteries only, applies to materials only, on a prorated basis, for period specified.

1. Warranty Period: Include the following warranty periods, from date of Substantial Completion:

a. Central Battery Equipment (excluding Batteries): One year(s).
b. Standard VRLA Batteries:

1) Full Warranty: One year.

c. Premium VRLA Batteries:

1) Full Warranty: One year.

d. NiCd, Wet-Cell Batteries:

1) Full Warranty: Five years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Central battery equipment must withstand the effects of earthquake motions determined according to ASCE/SEI 7. The designated central battery equipment must be tested and certified by an NRTL as meeting ICC-ES AC 156 test procedure requirements.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 INTERRUPTIBLE (SLOW-TRANSFER) CENTRAL BATTERY EQUIPMENT

A. Manufacturers Listing: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or approved equal:

1. Chloride Systems.
2. Controlled Power Company; an Emerson company.
3. Cooper Industries, Inc.
4. Crucial Power Products.
5. Dual-Lite.
6. Emergi-Lite; a Thomas & Betts brand.
7. Light-Alarm; a Thomas & Betts brand.
8. LightGuard, A Philips Group Brand.
9. Lithonia Lighting; Acuity Brands Lighting, Inc.
10. Myers Power Products, Inc.
11. Thomas & Betts Corporation; A Member of the ABB Group.
12. Or approved equal.

B. Performance Requirements:

1. Slow-Transfer Central Battery Equipment: Passive-standby (off-line) system. Automatically sense loss of normal alternating-current (ac) supply and use an electromechanical transfer switch to transfer loads. Transfer in one second or less from normal supply to battery-inverter supply.
2. Automatic Operation:

a. Normal Conditions: Supply the load with ac power flowing from normal ac power input terminals, bypassing inverter, with battery connected in parallel via rectifier/charger output.
b. Abnormal Supply Conditions: If normal ac supply deviates from specified voltage, transfer switch operates and battery supplies constant, regulated ac power through the inverter to the load, with a momentary loss of power to the load.
c. If normal power fails, transfer switch operates and battery supplies constant, regulated ac power through the inverter to the load, with a momentary loss of power to the load.

d. If a fault occurs in system when being supplied by inverter and current flows in excess of the overload rating of inverter, inverter automatically protects itself against damage from overloads and short circuits by shutting down.
e. When normal ac power is restored at input supply terminals of unit, controls automatically retransfer the load back to the normal ac supply, with a momentary loss of power to the load. Rectifier/charger then recharges battery.
f. If normal power failure is prolonged (more than 90 minutes), integral low-voltage battery protective circuit disconnects battery and prevents battery from damage due to deep discharge.
g. If battery becomes discharged, and when normal ac supply is again available, rectifier/charger recharges battery. When battery is fully charged, rectifier/charger automatically shifts to float-charge mode.
h. If battery is disconnected, and normal ac power is available, central battery equipment continues to supply power to the load with no degradation of its regulation of voltage and frequency of output bus.

C. Unit Operating Requirements:

1. Input AC Voltage Tolerance: Plus 10 and minus 15 percent of central battery equipment input voltage rating.
2. Input Frequency Tolerance: Plus or minus 5 percent of central battery equipment frequency rating.
3. Synchronizing Slew Rate: 1 Hz per second, maximum.
4. Minimum Off-Line Efficiency: 95 percent at 60 Hz, full load.
5. Minimum Displacement Primary-Side Power Factor: 98 percent under any load or operating condition.
6. Ambient Temperature Rating (Batteries): Not less than 32 deg F and not exceeding 104 deg F.
7. Ambient Storage Temperature Rating (Batteries): Not less than 0 deg F and not exceeding 104 deg F.
8. Humidity Rating: Less than 95 percent (noncondensing).
9. Altitude Rating: Not exceeding 3300 feet.
10. Off-Line Overload Capability: 1.5 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.

D. Inverter and Controls Logic: Microprocessor based, isolated from all power circuits; provides complete self-diagnostics, periodic automatic testing and reporting; with alarms.

E. Controls and Indication:

1. Status Indication: Door-mounted, labeled LED indicators or digital screen displaying the following conditions:

a. Normal power available.
b. Status of system.
c. Battery charging status.
d. On battery power.
e. System fault.
f. External fault.

2. Remote Signal Interfaces:

a. Remote Indication Interface: A minimum of one programmable (Form C) dry-circuit relay output(s) (120-V ac, 2 A) for remote indication of the following:

1) Fault or status indication.
2) On bypass.
3) Low battery.

F. Integral Input Disconnecting Means and OCPD: Thermal-magnetic circuit breaker, complying with UL 489.

1. Integrated Equipment Minimum Short-Circuit Current (Withstand) Rating: 22 kA.

G. Inverter:

1. Description: Solid-state, high-frequency, PWM type, with the following operational features:

a. Automatically regulate output voltage to within plus or minus 3 percent, for all load ranges and for maximum 25 percent step-load changes; regulation may increase to 8 percent for 100 percent step-load changes.
b. Automatically regulate output frequency to within plus or minus 1 Hz, from no load to full load, at unity power factor, over the operating range of battery voltage.
c. Output Voltage Waveform: Sine wave with maximum 5 percent TDD throughout battery operating-voltage range, for 100 percent linear load.
d. Load Power Factor: 0.5 lead to 0.5 lag.
e. Inverter Overload Capability: 115 percent for 10 minutes; 150 percent surge for 10 seconds.

H. Rectifier/Battery Charger:

1. Description: Solid state, variable rate, temperature compensated; automatically maintains batteries in fully charged condition when normal power is available.
2. Maximum Battery Recharge Time from Fully Discharged State: 24 hours.
3. Low-voltage disconnect circuit reduces battery discharge during extended power outages, monitors battery voltage, and disconnects inverter when battery voltage drops to no less than 85.7 percent of nominal voltage.

I. Batteries:

1. Description: Standard VRLA batteries.

a. Capable of sustaining full-capacity output of inverter unit for minimum of 90 minutes.

2. Battery Disconnect and OCPD: Manufacturer's standard.

J. Maintenance Bypass Systems:

1. Bypass Overload Capability: 1.5 times the base load current.

K. Integral Output Disconnecting Means and OCPD:

1. Single-Output OCPD: As scheduled on Drawings; manufacturer's standard ratings based on unit output ratings.

2.3 ENCLOSURES

A. Central Battery Equipment Enclosures: NEMA 250, to comply with environmental conditions at installed location.

1. Dry and Clean Indoor Locations: Type 1 steel cabinets with access to components through hinged doors with flush tumbler lock and latch.
2. Finish: Manufacturer's standard baked-enamel finish over corrosion-resistant prime treatment.

2.4 OPTIONAL AND ACCESSORY FEATURES

A. Factory-Installed Options and Accessories:

1. Multiple-Output Voltages: Supply unit branch circuits at different voltage levels if required. Transform voltages internally as required to produce indicated output voltages.
2. Split-Output Configuration: Divides output into normally on and normally off buses.
3. Auto-dialer.
4. Audible alarm with silencer switch.
5. Remote Summary Alarm Panel: Labeled LEDs on panel faceplate must indicate five basic status conditions. Audible signal indicates alarm conditions; silencing switch in face of panel silences signal without altering visual indication.

a. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.

2.5 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate central battery equipment fabricator's quality-control and testing methods.

B. Testing: Test and inspect central battery equipment according to UL 924.

C. Factory Tests: Test and inspect assembled central battery equipment according to UL 924. Affix standards organization's label. Include the following:

1. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
2. Full-load test.
3. Transient-load response test.
4. Overload test.
5. Power failure test.

D. Central battery equipment will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Receive, inspect, handle, and store central battery equipment according to NECA 411.

B. Examine areas, surfaces, and substrates to receive central battery equipment, with Installer present, for compliance with requirements for installation tolerances, structural support, ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment will be installed, before installation begins.

C. Examine equipment before installation. Reject equipment that is wet, moisture damaged, or mold damaged.

D. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 HARMONIC ANALYSIS STUDY

A. Perform a harmonic analysis study to identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze designated operating scenarios, including recommendations for central battery equipment input filtering to limit TDD and THD(V) to specified levels.

B. Prepare a harmonic analysis study and report complying with IEEE 399 and with NETA Acceptance Testing Specification.

3.4 INSTALLATION

A. Coordinate layout and installation of central battery equipment with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install central battery equipment and accessories according to NECA 411.

C. Wall-Mounted Central Battery Equipment: Install central battery equipment on walls with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For units not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

D. Suspended-Mounted Central Battery Equipment: Suspend central battery equipment from structural ceiling components using hangers, clamps, and associated fittings, designed for types and sizes of units to be supported. Provide support devices complying with Section 260529 "Hangers and Supports for Electrical Systems."

E. Floor-Mounted Central Battery Equipment: Install central battery equipment on 4-inch nominal-thickness concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.

F. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

G. Comply with NECA 1.

H. Wiring Methods:

1. Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters.
2. Install cables in raceways and cable trays except within consoles, cabinets, desks, counters, accessible ceiling spaces, and gypsum board partitions where unenclosed wiring method may be used.
3. Install conductors and cables concealed in accessible ceilings, walls, and floors where possible.
4. Conceal raceway and cables except in unfinished spaces.
5. Provide plenum-rated cable, where installed exposed or in open cable tray, within environmental airspaces, including plenum ceilings.

I. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.5 CONNECTIONS

A. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams unless otherwise indicated.

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Separately Derived Systems: Make grounding connections to grounding electrodes and bonding connections to metallic piping systems as indicated; comply with NFPA 70.

C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.6 INSTALLATION OF CONTROL WIRING

A. Install wiring between central battery equipment and remote devices and facility's central-control system.

B. Bundle, train, and support wiring in enclosures.

3.7 IDENTIFICATION

A. Identify central battery equipment, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label central battery equipment with engraved nameplates.
3. Label each separate cabinet, for multicabinet units.
4. Label each enclosure-mounted control and pilot device.

B. Operating Instructions: Frame printed operating instructions for central battery equipment, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of central battery equipment units.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

C. Acceptance Testing Preparation:

1. Inspect and Test Each Component:

a. Inspect wiring, components, connections, and equipment installations. Test and adjust components and equipment.
b. Test insulation resistance for all external branch circuit, feeder, control, and alarm wiring connected to central battery equipment element and component.
c. Test continuity of each circuit.

D. Tests and Inspections:

1. Inspect central battery equipment, wiring, components, connections, and equipment installation. Test and adjust components and equipment.

2. Test insulation resistance for all external branch circuit, feeder, control, and alarm wiring connected to central battery equipment element and component.
3. Test continuity of each circuit.
4. Verify that input voltages and frequencies at central battery equipment locations are within voltage and frequency limits specified in Part 2. If outside this range, notify Commissioner before closing input OCPDs.
5. Perform each visual and mechanical inspection and electrical test stated in manufacturer's written instructions and in NETA Acceptance Testing Specification, including specifically those for batteries, battery chargers, and UPS, regardless of the type of central battery equipment provided. Certify compliance with test parameters.
6. Perform a load-duration test at rated voltage and rated output current to verify the correct functional operation of the unit under full-load stable operating conditions for the minimum time limits required by UL 924. Monitor and record ambient temperature and temperatures within the unit.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of central battery equipment. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of central battery equipment 11 months after date of Substantial Completion.
    c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

9. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

E. Central battery equipment will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies central battery equipment and describes all test results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.9 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.10 ADJUSTING

A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

B. Set field-adjustable switches, auxiliary relays, and other adjustable parts.

C. Adjust the trip settings of thermal-magnetic circuit breakers with adjustable, instantaneous-trip elements; install fuses if not factory installed.

D. Set the automatic system test parameters.

E. Set field-adjustable, circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

3.11 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.

B. Replace central battery equipment whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.12 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate central battery equipment, and to use and reprogram microprocessor-based control, monitoring, and display functions.

END OF SECTION 263323.11

SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Nonautomatic transfer switches.
2. Transfer switch accessories.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
2. Include material lists for each switch specified.
3. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciators, and control panels.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Seismic Qualification Data: Certificates, for transfer switches, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1. Include the following:

a. Features and operating sequences, both automatic and manual.
b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Agency Qualifications:

1. Member company of NETA.

1.8 FIELD CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Commissioner's written permission.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA ICS 1.

C. Comply with NFPA 99.

D. Comply with NFPA 110.

E. Comply with UL 1008 unless requirements of these Specifications are stricter.

F. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

G. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination must exceed indicated fault-current value at installation location.
2. Short-time withstand capability for three cycles.

H. Repetitive Accuracy of Solid-State Controls: All settings must be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

I. Resistance to Damage by Voltage Transients: Components must meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components must meet or exceed voltage-impulse withstand test of NEMA ICS 1.

J. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes must be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.

K. Service-Rated Transfer Switch:

1. Comply with UL 869A and UL 489.
2. Provide terminals for bonding the grounding electrode conductor to the grounded service conductor.
3. In systems with a neutral, the bonding connection must be on the neutral bus.
4. Provide removable link for temporary separation of the service and load grounded conductors.

5. Surge Protective Device: Service rated.
6. Ground-Fault Protection: Comply with UL 1008 for normal bus.
7. Service Disconnecting Means: Externally operated, manual mechanically actuated.

L. Neutral Terminal: Solid and fully rated unless otherwise indicated.

M. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral must be double the nominal rating of circuit in which switch is installed.

N. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.

O. Battery Charger: For generator starting batteries.

1. Float type, rated 2 A.
2. Ammeter to display charging current.
3. Fused ac inputs and dc outputs.

P. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels must have communication capability matched with remote device.

Q. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable with printed tape markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
4. Accessible via rear or front access.

R. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 NONAUTOMATIC TRANSFER SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ASCO: a brand of Vertiv.
2. Caterpillar, Inc.; Electric Power Division.
3. Eaton.
4. ESL Power Systems, Inc.
5. Russelectric, Inc.
6. Or approved equal.

B. Manual and Electrically Operated: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Manual handle provides quick-make, quick-break manual-switching action. Switch shall be capable of electrically or manually transferring load in either direction with either or both sources energized. Control circuit disconnects from electrical operator during manual operation.

C. Double-Throw Switching Arrangement: Incapable of pauses or intermediate position stops during switching sequence.

D. Pilot Lights: Indicate source to which load is connected.

E. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and alternative-source sensing circuits.

1. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
2. Emergency Power Supervision: Red light with nameplate engraved "Alternative Source Available."

F. Unassigned Auxiliary Contacts: Switch must have one set of normally closed contacts for each switch position, rated 10 A at 240-V ac.

G. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Switch Action: Double throw; mechanically held in both directions.
2. Contacts: Silver composition or silver alloy for load-current switching.
3. Conductor Connectors: Suitable for use with conductor material and sizes.
4. Material: Hard-drawn copper, 98 percent conductivity.
5. Main and Neutral Lugs: Mechanical type.
6. Ground Lugs and Bus-Configured Terminators: Mechanical type.
7. Connectors must be marked for conductor size and type according to UL 1008.

2.3 TRANSFER SWITCH ACCESSORIES

A. Remote Annunciator System:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Functional Description: Remote annunciator panel must annunciate conditions for indicated transfer switches.
3. Annunciation panel display must include the following indicators:

a. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
b. Switch position.
c. Switch in test mode.
d. Failure of communication link.

4. Annunciator Panel: LED-lamp type with audible signal and silencing switch.

a. Indicating Lights: Grouped for each transfer switch monitored.

b. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
c. Mounting: Flush, modular, steel cabinet unless otherwise indicated.
d. Lamp Test: Push-to-test or lamp-test switch on front panel.

B. Remote Annunciator and Control System:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Include the following functions for indicated transfer switches:

a. Indication of sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
b. Indication of switch position.
c. Indication of switch in test mode.
d. Indication of failure of digital communication link.
e. Key-switch or user-code access to control functions of panel.
f. Control of switch-test initiation.
g. Control of switch operation in either direction.
h. Control of time-delay bypass for transfer to normal source.

3. Malfunction of annunciator, annunciation and control panel, or communication link must not affect functions of automatic transfer switch. In the event of failure of communication link, automatic transfer switch automatically must revert to standalone, self-contained operation. Automatic transfer-switch sensing, controlling, or operating function must not depend on remote panel for proper operation.
4. Remote Annunciation and Control Panel: Solid-state components. Include the following features:

a. Controls and indicating lights grouped together for each transfer switch.
b. Label each indicating light control group. Indicate transfer switch it controls, location of switch, and load it serves.
c. Digital Communication Capability: Matched to that of transfer switches supervised.
d. Mounting: Flush, modular, steel cabinet unless otherwise indicated.

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

B. Prepare test and inspection reports.

1. For each of the tests required by UL 1008, performed on representative devices, for emergency systems. Include results of test for the following conditions:

a. Overvoltage.
b. Undervoltage.
c. Loss of supply voltage.
d. Reduction of supply voltage.
e. Alternative supply voltage or frequency is at minimum acceptable values.

f. Temperature rise.
g. Dielectric voltage-withstand; before and after short-circuit test.
h. Overload.
i. Contact opening.
j. Endurance.
k. Short circuit.
l. Short-time current capability.
m. Receptacle withstand capability.
n. Insulating base and supports damage.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Floor-Mounting Switch: Anchor to floor by bolting.

1. Install transfer switches on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
3. Provide workspace and clearances required by NFPA 70.

B. Annunciator and Control Panel Mounting: Flush in wall unless otherwise indicated.

C. Identify components according to Section 260553 "Identification for Electrical Systems."

D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

E. Comply with NECA 1.

3.3 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, motor controls, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to City of New York if necessary to accommodate required wiring.

B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

F. Connect twisted pair cable according to Section 271513 "Communications Copper Horizontal Cabling."

G. Route and brace conductors according to manufacturer's written instructions and Section 260529 "Hangers and Supports for Electrical Systems." Do not obscure manufacturer's markings and labels.

H. Final connections to equipment must be made with liquidtight, flexible metallic conduit no more than 18 inches in length.

3.4 FIELD QUALITY CONTROL

A. Administrant for Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. After installing equipment, test for compliance with requirements according to NETA ATS.
2. Visual and Mechanical Inspection:

    a. Compare equipment nameplate data with Drawings and Specifications.
    b. Inspect physical and mechanical condition.
    c. Inspect anchorage, alignment, grounding, and required clearances.
    d. Verify that the unit is clean.
    e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
    f. Verify that manual transfer warnings are attached and visible.
    g. Verify tightness of all control connections.
    h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:

        1) Use of low-resistance ohmmeter.
        2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.

    i. Perform manual transfer operation.
    j. Verify positive mechanical interlocking between normal and alternate sources.
    k. Perform visual and mechanical inspection of surge arresters.
    l. Inspect control power transformers.

1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.

3. Electrical Tests:

a. Perform insulation-resistance tests on all control wiring with respect to ground.
b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
c. Verify settings and operation of control devices.
d. Calibrate and set all relays and timers.
e. Verify phase rotation, phasing, and synchronized operation.
f. Perform automatic transfer tests.
g. Verify correct operation and timing of the following functions:

1) Normal source voltage-sensing and frequency-sensing relays.
2) Engine start sequence.
3) Time delay on transfer.
4) Alternative source voltage-sensing and frequency-sensing relays.
5) Automatic transfer operation.
6) Interlocks and limit switch function.
7) Time delay and retransfer on normal power restoration.
8) Engine cool-down and shutdown feature.

4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.
b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
c. Verify that manual transfer warnings are properly placed.
d. Perform manual transfer operation.

5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
b. Simulate loss of phase-to-ground voltage for each phase of normal source.
c. Verify time-delay settings.
d. Verify pickup and dropout voltages by data readout or inspection of control settings.
e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.

    a. Verify grounding connections and locations and ratings of sensors.

C. Coordinate tests with tests of generator and run them concurrently.

D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

E. Transfer switches will be considered defective if they do not pass tests and inspections.

F. Remove and replace malfunctioning units and retest as specified above.

G. Prepare test and inspection reports.

H. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.

1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
3. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

3.5 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate transfer switches and related equipment.

B. Inatruction to include testing ground-fault protective devices and instructions to determine when the ground-fault system be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.

C. Coordinate this instruction with that for generator equipment.

END OF SECTION 263600

SECTION 264113 - LIGHTNING PROTECTION FOR STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes lightning protection system for ordinary structures.

B. Section includes lightning protection system for the following:

1. Ordinary structures.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layouts of the lightning protection system, with details of the components to be used in the installation.
2. Include raceway locations needed for the installation of conductors.
3. Details of air terminals, ground rods, ground rings, conductor supports, splices, and terminations, including concealment requirements.
4. Include roof attachment details, coordinated with roof installation.
5. Calculations required by NFPA 780 for bonding of metal bodies.

C. Coordination Drawings: Lightning protection system Shop Drawings, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Lightning protection cabling attachments to roofing systems and accessories.
2. Lightning protection strike termination device attachment to roofing systems, coordinated with the roofing system manufacturer.
3. Lightning protection system components penetrating roofing and moisture protection systems and system components, coordinated with the roofing system manufacturer.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of roof adhesive for attaching the roof-mounted air terminal assemblies, approved by the roofing-material manufacturer.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For lightning protection system to include in maintenance manuals.

1. In addition to items as required by DDC General Conditions, include the following:

a. Dimensioned site plan showing dimensioned route of the ground loop conductor and the ground rod locations. Comply with DDC General Conditions.
b. A system testing and inspection record, listing the results of inspections and ground resistance tests, as recommended by NFPA 780, Annex D.

B. Completion Certificate:

1. UL Master Label Certificate LPI Master Certificate.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: UL-listed installer, category OWAY.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Listing: Subject to compliance with requirements, provide product by one of the following:

1. Advanced Lightning Technology, Ltd.
2. East Coast Lightning Equipment Inc.
3. ERICO International Corporation.
4. Harger Lightning & Grounding.
5. Heary Bros. Lightning Protection Co. Inc.
6. Independent Protection Co.
7. National Lightning Protection.
8. Preferred Lightning Protection.
9. Robbins Lightning, Inc.
10. Thompson Lightning Protection, Inc.

11. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. NFPA Lightning Protection Standard: Comply with NFPA 780 requirements for Class I buildings.

B. UL Lightning Protection Standard: Comply with UL 96A requirements for Class I buildings.

C. Lightning Protection Components, Devices, and Accessories: Listed and labeled by a qualified testing agency as complying with UL 96, and marked for intended location and application.

2.3 MATERIALS

A. Air Terminals:

1. Copper or Aluminum unless otherwise indicated.
2. 3/8-inch diameter by 10 inches long.
3. Rounded tip.
4. Threaded base support.

B. Class 1 Main Conductors:

1. Stranded Copper: 57,400 circular mils in diameter.

C. Secondary Conductors:

1. Stranded Copper: 26,240 circular mils in diameter.

D. Ground Loop Conductor: Stranded copper.

E. Ground Rods:

1. Material: Solid copper.
2. Diameter: 3/4 inch.
3. Rods must be not less than 120 inches long.
4. Sectional type, with integral threads.

F. Conductor Splices and Connectors: Compression fittings that are installed with hydraulically operated tools, or exothermic welds, approved for use with the class type.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install lightning protection components and systems according to UL 96A.

B. Install conductors with direct paths from air terminals to ground connections. Avoid bends less than 90 degrees and 8 inches in radius and narrow loops.

C. Conceal conductors within normal view from exterior locations at grade within 200 feet of building. Comply with requirements for concealed installations in UL 96A.

1. Roof penetrations required for down conductors and connections to structural-steel framework must be made using listed through-roof fitting and connector assemblies with solid rods and appropriate roof flashings. Use materials approved by the roofing manufacturer for the purpose. Conform to the methods and materials required at roofing penetrations of the lightning protection components to ensure compatibility with the roofing specifications and warranty.
2. Install conduit where necessary to comply with conductor concealment requirements.
3. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's written instructions.

D. Ground Ring Electrode: The conductor must be not less than the main-size lightning conductor.

3.3 CONNECTIONS

A. Aboveground concealed connections, and connections in earth or concrete, must be done by exothermic welds or by high-compression fittings listed for the purpose.

B. Aboveground exposed connections must be done using the following types of connectors, listed and labeled for the purpose: bolted connectors.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3.4 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: The City of New York performs all Special Inspections (controlled inspections) under a seperate contract and will perform the following.:

1. Perform inspections as required to obtain a UL Master Label for system.
2. Perform inspections to obtain an LPI certification.

B. Prepare test and inspection reports and certificates.

END OF SECTION 264113

SECTION 264313 - SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract ."

1.2 SUMMARY

A. Section Includes:

1. Type 1 surge protective devices.
2. Enclosures.
3. Conductors and cables.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 262413 "Switchboards" for integral SPDs installed by switchboard manufacturer.
4. Section 262416 "Panelboards" for integral SPDs installed by panelboard manufacturer.
5. Section 262726 "Wiring Devices" for integral SPDs installed by receptacle manufacturer.

1.3 DEFINITIONS

A. I_n: Nominal discharge current.

B. Maximum Continuous Operating Voltage (MCOV): The maximum designated RMS value of the power frequency voltage that may be continuously applied to the mode of protection of an SPD.

C. Metal-Oxide Varistor (MOV): An electronic component with a significant bidirectional, nonlinear current-voltage characteristic.

D. Mode(s), Modes of Protection, or Protection Modes: Electrical paths where the SPD offers defense against transient overvoltages. Examples include: line to neutral (L-N), line to ground (L-G), line to line (L-L), and neutral to ground (N-G).

E. SCCR: Short-circuit current rating.

F. Type 1 SPDs: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device.

G. Type 2 SPDs: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel.

H. Type 3 SPDs: Point of utilization SPDs.

I. Type 4 SPDs: Component SPDs, including discrete components, as well as assemblies.

J. Type 5 SPDs: Discrete component surge suppressors, such as MOVs that may be mounted on a printed wiring board, connected by its leads or provided within an enclosure with mounting means and wiring terminations.

K. Voltage Protection Rating (VPR): A rating selected from UL 1449 list of preferred values assigned to each mode of protection.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include electrical characteristics, specialties, and accessories for SPDs.
b. Certification of compliance with UL 1449 by qualified electrical testing laboratory including the following information:

1) Tested values for VPRs.
2) In ratings.
3) MCOV, type designations.
4) OCPD requirements.
5) Manufacturer's model number.
6) System voltage.
7) Modes of protection.

B. Field quality-control reports.

1.6 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that SPDs perform in accordance with specified requirements and agrees to provide repair or replacement of SPDs that fail to perform as specified within warranty period.

1. Initial Warranty Period: Five year(s) from date of Substantial Completion, for labor, materials, and equipment.
2. Follow-On Warranty Period: 10 year(s) from date of Substantial Completion, for materials only, f.o.b. the nearest shipping point to Project site.

PART 2 - PRODUCTS

2.1 TYPE 1 SURGE PROTECTIVE DEVICES (SPDs)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB (Electrification Products Division).
2. Advanced Protection Technologies Inc. (APT).
3. ALLTEC.
4. Citel, Inc.
5. DITEK Surge Protection.
6. Eaton.
7. Leviton Manufacturing Co., Inc.
8. Liebert; a brand of Vertiv.
9. Mersen USA.
10. Schneider Electric USA, Inc.
11. Siemens Industry, Inc., Energy Management Division.
12. SSI, an ILSCO Company.
13. Or approved equal.

B. Source Limitations: Obtain devices from single source from single manufacturer.

C. General Characteristics:

1. Reference Standards: UL 1449, Type 1.
2. MCOV: Not less than 125 percent of nominal system voltage for 208Y/120 V and 120/240 V power systems, and not less than 115 percent of nominal system voltage for 480Y/277 V power systems.
3. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase must not be less than 200 kA. Peak surge current rating must be arithmetic sum of the ratings of individual MOVs in a given mode.
4. Protection modes and UL 1449 VPR for grounded wye circuits with 208Y/120 V, three-phase, four-wire circuits must not exceed the following:

    a. Line to Neutral: 700 V for 208Y/120 V.
    b. Line to Line: 1200 V for 208Y/120 V.

5. SCCR: Not less than 100 kA.
6. In Rating: 20 kA.

D. Options:

1. Include integral disconnect switch.

2. Include internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include indicator light display for protection status.

2.2 ENCLOSURES

A. Indoor Enclosures: Type 1.

2.3 CONDUCTORS AND CABLES

A. Power Wiring: Same size as SPD leads, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Provide OCPD and disconnect for installation of SPD in accordance with UL 1449 and manufacturer's instructions.

B. Install leads between disconnects and SPDs short, straight, twisted, and in accordance with manufacturer's instructions. Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

1. Do not splice and extend SPD leads unless specifically permitted by manufacturer.
2. Do not exceed manufacturer's recommended lead length.
3. Do not bond neutral and ground.

C. Use crimped connectors and splices only. Wire nuts are unacceptable.

3.3 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Compare equipment nameplate data for compliance with Drawings and the Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's installation requirements.

C. Nonconforming Work:

1. SPDs that do not pass tests and inspections will be considered defective.
2. Remove and replace defective units and retest.

D. Prepare test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to supervise field tests and inspections.

3.4 STARTUP SERVICE

A. Complete startup checks in accordance with manufacturer's instructions.

B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests; reconnect them immediately after the testing is over.

C. Energize SPDs after power system has been energized, stabilized, and tested.

END OF SECTION 264313

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Materials
2. Luminaire support.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
6. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors will be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-79 and IES LM-80.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each luminaire and for each color and texture with standard factory-applied finish.

D. Samples for Initial Selection: For each type of luminaire with custom factory-applied finishes.

1. Include Samples of luminaires and accessories involving color and finish selection.

E. Samples for Verification: For each type of luminaire.

1. Include Samples of luminaires and accessories to verify finish selection.

F. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

G. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
4. Structural members to which equipment and or luminaires will be attached.
5. Initial access modules for acoustical tile, including size and locations.
6. Items penetrating finished ceiling, including the following:

    a. Other luminaires.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.

f. Ceiling-mounted projectors.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing laboratory providing photometric data for luminaires.

B. Product Certificates: For each type of luminaire.

C. Product Test Reports: For each type of luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Luminaire Photometric Data Testing Laboratory Qualifications:

1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.

1. Obtain Commissioner's approval of luminaires in mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.10 WARRANTY

A. Warranty: Manufacturer agrees to provide components for repair or replacement of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance:

1. Luminaires must withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
2. Luminaires and lamps will be labeled vibration and shock resistant.
3. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

B. Ambient Temperature: 41 to 104 deg F.

1. Relative Humidity: Zero to 95 percent.

C. Altitude: Sea level to 1000 feet.

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label must include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI.

C. Recessed luminaires will comply with NEMA LE 4.

D. NRTL Compliance: Luminaires for hazardous locations must be listed and labeled for indicated class and division of hazard by an NRTL.

2.3 LUMINAIRE TYPE F1/F1A - Reccesed 4 Inch Diameter Aperture Fixed LED Downlight.

A. Location for F1: Quiet Room, Teen Reading Room, Adult Reading Room, Vestibule.

B. Location for F1A: Corridor, Cellar and 1st Floor Lobbies, Checkout, Alcove, Staff Lounge, Early Childhood.

C. Mounting: Recessed.

D. Housing: Nominal 4 inch diameter, aluminum and 22 gauge galvanized steel housing, extruded aluminum housing panel to act as heat-sink, white flange, white removable baffle for field replaceable optics, microflange trim, overall housing dimensions not exceeding 16 inch length x 10 inch width x 4 inch depth.

E. Lens: Soft focus lens.

F. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

G. Lamp: Integral 3000K LED, 80+ CRI, 60 deg optic, Minimum 2291 delivered lumen, 31W.

H. Basis-of-Design Product: Subject to compliance with requirements, provide Lucifer Lighting; F4R-MFS-1-WH-WH-80C30A-30-60-Y-1-AN4-MOD, or comparable product by one of the following:

1. USAI.
2. Lumenwerx.
3. Or approved equal.

I. Notes:

1. F1A same as F1 except with 21W, 1711 lumen package.
2. Commissioner to verify finish.
3. Housing must accommodate to min. 1-1/16 inch ceiling thickness.
4. Fixture to be installed in ceiling system. Commissioner to verify mounting details.
5. Commissioner to provide a mockup with the specified fixture and ceiling system sample.

2.4 LUMINAIRE TYPE F2/F2A - RECESSED 4 INCH DIAMETER APERTURE ADJUSTABLE LED DOWNLIGHT.

A. Location for F2: 2nd Floor Lobby, 2nd Floor Multi-Purpose Room, Children's Reading Room, 2nd Floor above Staircase 1.

B. Location for F2A: 2nd Floor above Staircase 1.

C. Mounting: Recessed.

D. Housing: Nominal 4 inch diameter, aluminum and 22 gauge galvanized steel housing, extruded aluminum housing panel to act as heat-sink, aiming mechanism integral to the housing, tilt up to 40 deg and 365 deg rotation, white flange, white removable baffle for field replaceable optics, microflange trim, overall fixture dimensions not exceeding 16 inch length x 10 inch width x 4 inch deep.

E. Lens: Soft focus lens.

F. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

G. Lamp: Integral 3000K LED, 80+ CRI, 60 deg optic, Minimum 1711 delivered lumen, 21W.

H. Basis-of-Design Product: Subject to compliance with requirements, provide Lucifer Lighting; F4R-MAS-1-WH-WH-80C23A-30-60-Y-1-AN4-MOD, or comparable product by one of the following:

1. Lumenwerx.
2. USAI.
3. Or approved equal.

I. Notes:

1. F2A same as F2 except with 40 deg optic.
2. Commissioner to verify finish.
3. Housing must accommodate to min. 1-1/16 inch ceiling thickness.
4. Fixture to be installed in ceiling system. Commissioner to verify mounting details.
5. Fixture to be installed in a slopped ceiling aimed straight down.

2.5 LUMINAIRE TYPE F3 - RECESSED 3 INCH DIAMETER APERTURE FIXED LED DOWNLIGHT

A. Location for F3: BOH.

B. Mounting: Recessed.

C. Housing: Pre-installed mounting bracket which allows vertical adjustment of bar hangers up to 1 inch, 4 inch octagonal deep junction box, and Die-cast aluminum beveled trim with 2 5/16 inch aperture.

D. Lens: Wide Flood spread lens.

E. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

F. Lamp: Integral 3000K LED, 93+CRI, 60 deg optic, Minimum 1000 delivered lumen, 12.5W.

G. Basis-of-Design Product: Subject to compliance with requirements, provide DMF; DRDH-N-JD-DRD2M-10-9-30-WF-O-DRD2T-R-JD-S-WH, or comparable product by one of the following:

1. USAI.
2. CSL.
3. Or approved equal.

H. Notes:

1. Commissioner to verify finish.
2. Commissioner to verify EM requirements.

3. Commissioner to verify ceiling thickness for fixture mounting.

2.6 LUMINAIRE TYPE F6 - PERIMETER RECESSED 3 INCH WIDTH CONTINUOUS LINEAR LED LENSED DOWNLIGHT.

A. Location for F6 mounted in GWB ceiling: WC, 1st and 2nd Floor Lobbies, Quiet Room, Teen Reading Room, Vestibule, Early Childhood, Children's Reading Room.

B. Location for F6 mounted in Wood ceiling: Adult Reading Room.

C. Mounting: Recessed.

D. Housing for GWB ceiling installation: Extruded aluminum housing, white finish, drywall mud flange, dimensions not exceeding 3 inch width x 5 inch deep x length as required.

E. Housing for Wood ceiling installation: Extruded aluminum housing, silver finish, trimless flange, dimensions not exceeding 3 inch width x 5 inch deep x length as required.

F. Lens: Levelled lens, High-efficiency Lambertian optic.

G. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

H. Lamp: Integral 3000K LED, 80 CRI, Minimum 500 lumens/ft, 5W/ft.

I. Basis-of-Design Product for GWB ceiling installation: Subject to compliance with requirements, provide Lumenwerx; V3PER5-HLO-LED-80-500-30-(Length)-UNV-D1-1-DMF-W, or comparable product by one of the following:

1. Coronet
2. Amerlux.
3. Or approved equal.

J. Basis-of-Design Product for Wood ceiling installation: Subject to compliance with requirements, provide Lumenwerx; V3PER5-HLO-LED-80-500-30-(Length)-UNV-D1-1-DTL-SILVER, or comparable product by one of the following:

1. Coronet
2. Amerlux.
3. Or approved equal.

K. Notes:

1. Commissioner to verify lengths per plan.
2. Drywall mud-in flange in white finish to be installed in GWB ceiling.
3. Trimless flange in silver finish to be installed in Wood ceiling.
4. Commissioner to verify finish.
5. Commissioner to verify mounting with architectural detail drawing.
6. Modification might be needed pending the final architectural details.
7. Factory shop drawing required.

2.7 LUMINAIRE TYPE F7 - SURFACE MOUNTED CONTINUOUS LINEAR LED GRAZER DOWNLIGHT.

A. Location for F7: 2nd floor above Staircase 1, 2nd floor Lobby, 2nd floor Multi-purpose Room.

B. Mounting: Surface mounted.

C. Housing: Aluminum housing, butt end to end connection for continuous aesthetic, 180 deg adjustment rotation capability for vertical surface mounting, quick track mounting to ensure a continuous straight run, symmetric louver accessory, dimensions not exceeding 2 inch width x 2.5 inch deep x length as required.

D. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

E. Lamp: Integral 3000K LED, 80+CRI, 30 deg x 60 deg optics, Minimum 1047 lumens/ft, 12W/ft.

F. Basis-of-Design Product: Subject to compliance with requirements, provide I2Systems; R-12W-30K-H-V-13-QT-S, or comparable product by one of the following:

1. Ecosense.
2. Acclaim.
3. Or approved equal.

G. Notes:

1. Commissioner to verify lengths per plan.
2. Symmetric louver required.
3. Fixture to be installed in the ceiling cove. Commissioner to verify mounting with architectural detail drawings.
4. Commissioner to verify finish.
5. Commissioner to provide a full-size mock-up on site to review the fixture mounting details at the art brick wall.

2.8 LUMINAIRE TYPE F8/F8A - RECESSED 3 INCH WIDTH CONTINUOUS LINEAR LED LENSED DOWNLIGHT.

A. Location for F8: Book Return, Staff Office.

B. Location for F8A: Cellar Multi-purpose Room.

C. Mounting: Recessed.

D. Housing: Extruded aluminum housing, white finish, tegular 15/16 inch mounting, dimensions not exceeding 3 inch width x 4 inch deep x length as required.

E. Lens: Flush lens, High-Efficiency Lambertian Optic.

F. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

G. Lamp: Integral 3000K LED, 80 CRI, Minimum 500 lumens/ft, 5W/ft.

H. Basis-of-Design Product: Subject to compliance with requirements, provide Lumenwerx; VIA2R-HLO-FH-LED-80-500-30-UNV-D1-1-TG15-W, or comparable product by one of the following:

1. Coronet
2. Amerlux.
3. Or approved equal.

I. Notes:

1. F8A same as F8 except with drywall trimless mounting for sloped wooden ceiling installation. Commissioner to verify mounting with architectural detail drawings.
2. Commissioner to verify mounting option.
3. Commissioner to verify lengths per plan.
4. Commissioner to verify finish.
5. F8 fixture to be installed in Tectum Square Tegular system. Commissioner to verify mounting details.
6. Factory shop drawing required.

2.9 LUMINAIRE TYPE F10B - SUSPENDED NOMINAL 4 FT 3-SIDED LINEAR LED LENSED DOWNLIGHT.

A. Location for F10B: Electrical/Mechanical.

B. Mounting: Suspended.

C. Housing: Die Formed 16 gauge steel housing and end caps with tamper-proof screws, white finish, pendant stem mounting, dimensions not exceeding 4 foot length x 4.5 inch width x 4.5 inch depth.

D. Lens: 3-sided, 0.125 inch tamper and impact resistance clear polycarbonate lens.

E. Driver: Integral 0-10V dimming driver, UNV 120-277V.

F. Lamp: Integral 3000K LED, 90 CRI, Minimum 675 lumens/ft, 7.25W/ft.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Coronet; VP-LED-4-30-LTG1-UNV-DB-W-PS, or comparable product by one of the following:

1. Mercury Lighting.
2. Legion.
3. Or approved equal.

H. Notes:

1. Commissioner to verify finish and mounting height.

2.10 LUMINAIRE TYPE F11 - WALL MOUTNED LED WALL PACK.

A. Location for F11: Roof-Mechanical Space.

B. Mounting: Wall mounted.

C. Housing: UL 1598 wet location listed, IP66 ingress protection rated, die-cast aluminum housing with removable die-cast aluminum full cutoff door, silicone gasket seals the optical chamber, standard bronze finish, dimensions not exceeding 17 inch length x 10 inch height x 17 inch depth.

D. Lens: Full cutoff, highly reflective anodized aluminum reflectors, impact resistant refractive glass.

E. Driver: Integral 0-10V dimming driver, Class 2 rated, UNV 120-277V.

F. Lamp: Integral 300K LED, 70+CRI, Minimum 2279 lumen, 32W.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Lumark; LD-WP-FC-4B-ED, or comparable product by one of the following:

1. FC Lighting.
2. Lithonia.
3. Or approved equal.

H. Notes:

1. UL wet location listed.
2. Commissioner to verify finish and mounting height.
3. Refer to architectural drawing for mounting height.

2.11 LUMINAIRE TYPE F12 - WALL MOUNTED NOMINAL 4 FT LINEAR LED LIGHT.

A. Location for F12: Custodian Closet (C18), IT Closet, Inverter Closet, Cellar Kitchenette, Storage (C03).

B. Mounting: Wall mounted.

C. Housing: Heavy gauge steel housing, white finish, dimensions not exceeding 4 foot length x 3 inch width x 4.5 inch depth.

D. Lens: Round, ribbed white acrylic diffuser.

E. Driver: Integral 0-10V dimming driver, UNV 120-277.

F. Lamp: Integral 3000K LED, 90+CRI, Minimum 652 lumens/ft, 7.25 W/ft.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Coronet; FP1 LED-4-30-LTG1-UNV-DB-W-WM, or comparable product by one of the following:

1. Bartco.

2. Lamar.
3. Lumenwerx.
4. Or approved equal.

H. Notes:

1. Commissioner to verify finish.

2.12 LUMINAIRE TYPE F13 - WALL MOUNTED NOMINAL 4 FT LINEAR LED LIGHT.

A. Location for F13: Egress Stair.

B. Mounting: Wall mounted.

C. Housing: Die formed 20 gauge steel housing, white finish, dimensions not exceeding 4 foot length x 4.5 inch width x 4.5 inch depth.

D. Lens: 3-sided, frosted white lens.

E. Driver: Integral 0-10V dimming driver, UNV 120-277V.

F. Lamp: Integral 3000K LED, 90CRI, Minimum 3679 lumens/4ft, 7.25W/ft.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Mercury; LW4-4-3800-30K-HTA-1%-UNI, or comparable product by one of the following:

1. Bartco.
2. Lamar.
3. Or approved equal.

H. Notes:

1. Commissioner to verify finish, mounting height, and orientation.
2. Refer to architectural drawing for mounting height and orientation.
3. Fixture must be ADA compliant.

2.13 LUMINAIRE TYPE F17 - SUSPENDED VERTICAL LINEAR TUBE LED WITH DOWNLIGHT.

A. Location for F17: Teen Reading Room, Adult Reading Room.

B. Mounting: Suspended from 5.5 inch canopy and stem with remote supply.

C. Housing: Aluminum housing, end plate matching the finish of the canopy, dimensions not exceeding 4 inch diameter x 4 foot height.

D. Lens: White gloss acrylic diffuser for the tube extending top to bottom.

E. Driver: Remote 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

F. Lamp: Tube - Integral 3000K LED, 80+CRI, Minimum 4,723 lumens, 53W, Downlight - Integral 3000K LED, 45 deg beam, 80+CRI, minimum 1100 lumens, 14W.

G. Basis-of-Design Product: Subject to compliance with requirements, provide SPI; Pavo 4 inch series, SIP12125-L53W-120-277V-3000K-14W-45-OA-CAS-AC1, or comparable product by one of the following:

1. Aura Custom Lighting.
2. VISO Lighting.
3. Or approved equal.

H. Notes:

1. Commissioner to verify finish and mounting height.
2. Refer to architectural drawing for the fixture size intent and detailed information.
3. Provide appropriate quantity of 0-10V dimming driver in a remote, accessible, and ventilated location in accordance with the manufacturer's recommendations.
4. Commissioner to verify remote driver locations.
5. Modified to 2-circuit, Ckt #1: Tube light and Ckt #2: Downlight.
6. Provide (1) working sample for review.
7. Provide the sample of acrylic lens options.

2.14 LUMINAIRE TYPE F18 - SURFACE MOUNTED CONTINUOUS LINEAR LED DOWNLIGHT.

A. Location for F18: Staircase 1.

B. Mounting: Surface mounted.

C. Housing: Extruded aluminum housing, aluminum finish, drywall mounting, dimensions not exceeding 2 1/2 inch width x 3 3/4 inch deep x length as required.

D. Lens: Flush lens, High-efficiency Lambertian optic.

E. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

F. Lamp: Integral 3000K LED, 80CRI, Minimum 500 lumens/ft, 5W/ft.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Lumenwerx; VIA2S-D-HLO-FH-SW-80-500-30-(Length)-UNV-D1-1C-NA-DRC-AL-(CUSTOM PATTERN), or comparable product by one of the following:

1. Amerlux.
2. Coronet.
3. Or approved equal.

H. Notes:

1. Commissioner to verify lengths per plan and custom pattern along the stair.

2. Commissioner to verify finish.
3. Fixture to be installed in the staircase stringer. Commissioner to verify mounting with architectural detail drawing.
4. Commissioner to verify EM requirements.
5. Modification required. Power feed will be from side end of fixture run.
6. Refer to electrical drawing for power feed locations.
7. Factory shop drawing required with fixture run length, mounting details and power feed locations.

2.15 LUMINAIRE TYPE F19 - RECESSED PERIMETER CONTINUOUS LINEAR LED DOWNLIGHT.

A. Location for F19: Cellar Multi-purpose Room.

B. Mounting: Recessed.

C. Housing: Extended aluminum housing, white finish, drywall trimless perimeter mounting, dimensions not exceeding 2 1/2 inch width x 5 1/2 inch deep x length as required.

D. Lens: Flush lens, High-efficiency Lambertian optic.

E. Driver: Integral 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

F. Lamp: Integral 3000K LED, 80CRI, Minimum 500 lumens/ft, 5W/ft.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Lumenwerx; V2PERL-HLO-SW-80-500-30-(Length)-UNV-D1-1-DTL-W, or comparable product by one of the following:

1. Amerlux.
2. Coronet.
3. Or approved equal.

H. Notes:

1. Commissioner to verify lengths per plan.
2. Commissioner to verify finish.
3. Fixture to be installed in wood ceiling. Commissioner to verify mounting with architectural detail drawings.
4. Modification might be needed pending the final architectural drawing.
5. Factory shop drawing required.

2.16 LUMINAIRE TYPE F20 - RECESSED CONTINUOUS LINEAR LENSED LOW VOLTAGE LED DOWNLIGHT IN MILLWORK.

A. Location for F20: Cellar Book showcase alcove, Teen Reading Room, 201 Reading room.

B. Mounting: Surface mounted within alcove.

C. Shallow extruded aluminum profile with dimensions not exceeding 0.75 inch width x 0.7 inch height in cross section and side cable position for a hairline connection.

D. Lens: Low opal dot free lens.

E. Driver: Remote 0-10V dimming driver, dim to 1 percent, UNV 120-277V.

F. Lamp: 24V constant voltage flexible LED tape, 3000K, 95CRI, Minimum 260 lumens/ft, 3W/ft, cuttable length every 2.46 inch.

G. Basis-of-Design Product: Subject to compliance with requirements, provide LEDLinear; VARIOLED0002-NEXUSHD10-W8-30-LO-(Cable/Connector)-S-FMC-IP20, or comparable product by one of the following:

1. QTran
2. Acolyte.
3. Or approved equal.

H. Notes:

1. Commissioner to verify lengths per plan.
2. Commissioner to verify mounting per architectural detail drawing.
3. Provide appropriate quantity of 0-10V dimming driver in a remote, accessible, and ventilated location in accordance with the manufacturer's recommendations.
4. Provide all necessary items for a complete installation.
5. Provide dot free lens.

2.17 LUMINAIRE TYPE F21 - SURFACE MOUNTED LINEAR LED COVE LIGHT.

A. Location for F21: Elevator Cab.

B. Mounting: Surface mounted within a cove.

C. Housing: Extruded aluminum housing with dimensions not exceeding 1.64 inch width x 1.41 inch height in cross section, stainless steel fasteners, plastic endcaps rubber overmold for cable assembly.

D. Lens: Clear polycarbonate lens.

E. Driver: Integral ELV dimming driver, dim to 0.1 percent, UNV 120-277V.

F. Lamp: Integral 3000K LED, 80+ CRI, 120 deg optic, Minimum 1273 lumen,/ft, 12W/ft.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Ecosense; L35-1-12”-12-80-MULT-120, or comparable product by one of the following:

1. I2Systems.
2. SSL Lighting.
3. Or approved equal.

H. Notes:

1. Commissioner to verify lengths per plan.
2. To be installed in elevator cab cove. Commissioner to verify mounting with architectural detail drawings.
3. Provide all necessary items for a complete installation.
4. Refer to electrical drawing for power feed locations.
5. Factory shop drawing required with fixture run length, mounting details and power feed locations.

2.18 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components must be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A 36/A 36M for carbon structural steel.
2. ASTM A 568/A 568M for sheet steel.

C. Stainless Steel:

1. Manufacturer's standard grade.
2. Manufacturer's standard type, ASTM A 240/240 M.

D. Galvanized Steel: ASTM A 653/A 653M.

E. Aluminum: ASTM B 209.

2.19 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.20 LUMINAIRE SUPPORT

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, .

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TEMPORARY LIGHTING

A. If approved by the Commissioner, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.4 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices must be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.

3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaires:

1. Ceiling Mount:

a. 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
b. Pendant mount with 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
c. Hook mount.

2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies must be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Commissioner.

END OF SECTION 265119

SECTION 265213 - EMERGENCY AND EXIT LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Emergency lighting.
2. Exit signs.
3. Materials.
4. Luminaire support components.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 265119 "LED Interior Lighting" for fixture specification.
4. Section 265619 "LED Exterior Lighting" for fixture specification.

1.3 DEFINITIONS

A. Correlated Color Temperature (CCT): The absolute temperature, measured in kelvins, of a blackbody whose chromaticity most nearly resembles that of the light source.

B. Color Rendering Index (CRI): Measure of the degree of color shift that objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference source.

C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.

D. Lumen (lm): The SI derived unit of luminous flux equal to the luminous flux emitted within a unit solid angle by a unit point source (1 lm = 1 cd-sr).

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of emergency lighting unit, exit sign, and emergency lighting support.

a. Include data on features, accessories, and finishes.
b. Include physical description of unit and dimensions.
c. Battery and charger for light units.
d. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
e. Include photometric data and adjustment factors based on laboratory tests by, or under supervision of, qualified luminaire photometric testing laboratory, for each luminaire type.

B. Shop Drawings:

1. For nonstandard or custom luminaires.

a. Include plans, elevations, sections, and mounting and attachment details.
b. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
c. Include diagrams for power, signal, and control wiring.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

PART 2 - PRODUCTS (NOT USED)

2.1 EMERGENCY LIGHTING

A. Emergency Luminaire <selective normal lighting fixtures as shown in EL series drawings>:

2.2 EXIT SIGNS

A. General Characteristics: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Sign <EL series drawings>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amerlux.
b. Eaton (Lighting).
c. Evenlite, Inc.
d. Hubbell Incorporated, Lighting.
e. Lithonia Lighting; Acuity Brands Lighting, Inc.
f. Ruud Lighting Direct.
g. Signify North America Corporation (formerly Philips Lighting).
h. Or approved equal.

2. Options:

a. Operating at nominal voltage of 120 V(ac).

b. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.

2.3 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components must be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access:

1. Smooth operating, free of light leakage under operating conditions.
2. Designed to permit relamping without use of tools.
3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Housings:

1. Extruded aluminum housing.

2. Anodized finish.

E. Conduit: EMT , minimum metric designator 21 (trade size 3/4).

2.4 METAL FINISHES

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.5 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

B. Install lamps in each luminaire.

C. Supports:

1. Sized and rated for luminaire and emergency power unit weight.
2. Able to maintain luminaire position when testing emergency power unit.
3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.

4. Luminaire-mounting devices must be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of luminaire weight.

D. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

E. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inch, brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

F. Ceiling Grid Mounted Luminaires:

1. Secure to outlet box, if provided.
2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

C. Nonconforming Work:

1. Luminaire will be considered defective if it does not pass operation tests and inspections.
2. Remove and replace defective units and retest.

D. Prepare test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.6 SYSTEM STARTUP

A. Perform startup service:

1. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.
2. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test.

3.7 ADJUSTING

A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:

1. Inspect luminaires. Replace lamps, emergency power units , batteries, exit signs, and luminaires that are defective.

a. Parts and supplies must be manufacturer's authorized replacement parts and supplies.

2. Conduct short-duration tests on all emergency lighting.

3.8 PROTECTION

A. Remove and replace luminaires and exit signs that are damaged or caused to be unfit for use by construction activities.

END OF SECTION 265213

SECTION 265619 - LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.

5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors will be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.

    a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
    b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires must be certified by manufacturer.

6. Wiring diagrams for power, control, and signal wiring.
7. Photoelectric relays.
8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Sustainable Design Submittals:

1. Product Data: BUG ratings.
2. Product Data: Luminaire calculations.
3. Product Data: Indicating luminaire is certified by ENERGY STARand or Design Lights Consortium.

D. Engineering Services Submittal: For luminaire supports.

1. Include design calculations for luminaire supports and seismic restraints.

E. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Structural members to which equipment and luminaires will be attached.
3. Underground utilities and structures.
4. Existing underground utilities and structures.
5. Above-grade utilities and structures.
6. Existing above-grade utilities and structures.
7. Building features.
8. Vertical and horizontal information.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing laboratory providing photometric data for luminaires.

B. Product Certificates: For each type of the following:

1. Luminaire.
2. Photoelectric relay.

C. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Source quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and photoelectric relays to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Luminaire Photometric Data Testing Laboratory Qualifications:

1. Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Each luminaire type must be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Commissioner prior to the start of luminaire installation.

1.11 WARRANTY

A. Warranty: Manufacturer and Installer agree to provide components for repair or replacement of luminaires that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including luminaire support components.
b. Faulty operation of luminaires and accessories.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 5 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires must be listed and labeled for indicated class and division of hazard by an NRTL.

C. UL Compliance: Comply with UL 1598 and listed for wet location.

D. Lamp base complying with ANSI C81.61 or IEC 60061-1.

E. Bulb shape complying with ANSI C79.1.

F. CRI of minimum 80. CCT of 3000 K.

G. L70 lamp life of 50,000 hours.

H. Lamps dimmable from 100 percent to 0 percent of maximum light output.

I. Internal driver.

J. Source Limitations:

1. Obtain luminaires from single source from a single manufacturer.
2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 LUMINAIRE TYPE X1 - EXTERIOR RATED WALL RECESSED LED STEP LIGHT.

A. Location for X1: All entrances on the 1st floor.

B. Mounting: Wall recessed.

C. Housing: Die-cast aluminum marine grade housing, reflector made of pure anodized aluminum, composite installation housing, dimensions not exceeding 12 1/2 inch length x 5 inch depth x 2 3/4 inch height.

D. Lens: Clear safety glass.

E. Driver: Integral 0-10V dimming driver.

F. Lamp: Integral 3000K LED, Asymmetric widespread beam optic, Minimum 621 lumens, 8.2W.

G. Basis-of-Design Product: Subject to compliance with requirements, provide BEGA; 33049-K3-(Finish), or comparable product by one of the following:

1. Sistemalux.
2. WE-EF.
3. Or approved equal.

H. Notes:

1. IP65 protection class.
2. NRTL wet locations listed.
3. Commissioner to verify finish and mounting height.

2.3 LUMINAIRE TYPE X2/X2A - EXTERIOR RATED WALL MOUNTED CYLINDER LED DOWNLIGHT.

A. Location for X2/X2A: Under the Flag, Infront of Book Return.

B. Mounting: Wall mounted.

C. Housing: Cylindrical profile, machined aluminum body housing, mounts to standard 4 inch octagonal box, can be positioned facing up or down, dimensions not exceeding 3 inch diameter x 6.7 inch height.

D. Lens: 1/4 inch thick tempered glass lens.

E. Driver: Integral 0-10V dimming driver, UNV120-277V.

F. Lamp: Integral 3000K LED, 60 deg beam optic, Minimum 1495 delivered lumens, 21W.

G. Basis-of-Design Product: Subject to compliance with requirements, provide Lucifer Lighting; CW2-DF-2-(Finish)-BK-80C23A-30-60-00-RP1-4, or comparable product by one of the following:

1. Ecosense.
2. ALW.
3. Or approved equal.

H. Notes:

1. X2A same as X2 except with upward fixture orientation and 15 deg beam spot optic (1539 delivered lumens) and clear lens.
2. Commissioner to verify finish and mounting height.
3. X2A fixture to be modified to have upward position only.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls, roofs, canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TEMPORARY LIGHTING

A. If approved by the Commissioner, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Install lamps in each luminaire.

D. Fasten luminaire to structural support.

E. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.

4. Luminaire-mounting devices must be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

F. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.

G. Wiring Method: Install cables in raceways. Conceal raceways and cables.

H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.

I. Coordinate layout and installation of luminaires with other construction.

J. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

K. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections and wiring methods.

3.5 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

A. Aim as indicated on Drawings.

B. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.6 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.7 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify operation of photoelectric controls.

C. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):

   a. IES LM-5.
   b. IES LM-50.
   c. IES LM-52.
   d. IES LM-64.
   e. IES LM-72.

2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

D. Luminaire will be considered defective if it does not pass tests and inspections.

E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.9 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies must be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Commissioner.

END OF SECTION 265619

SECTION 270526 – GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes: a uniform telecommunication grounding (earthing) and bonding infrastructure and its interconnection to other building systems:

1. Busbars
2. Grounding and bonding connectors
3. Ground lugs

B. Related Requirements:

1. Section 270529 "Conduits and Backboxes for Communications Systems"
2. Section 270536 "Cable Trays for Communications Systems"
3. Section 270553 "Identification for Communications Systems"
4. Section 271116 "Communications Cabinets, Racks, Frames and Enclosures"
5. Section 271513 "Communications Copper Horizontal Cabling"

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other Work.
2. Provide schematic drawings of the complete grounding system identifying all connection points.
3. Include the location of system ground electrode connections and the routing of above ground and underground electrode conductors.

C. Samples: For each component.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.

B. Product Certificates: For all installed equipment.

1. All components of the grounding and bonding system must be from the same Manufacturer.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: For each product

B. Operation and Maintenance Data: For each product

C. Warranty Documentation: For the system

D. Record Documentation

1. Record drawings indicating the location of all components and component identification.
2. Test reports indicating the resistance to ground at each busbar.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Ambient Conditions: Do not conduct the test to report for completeness of the system until the electrical power for the entire site is live and operational.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chatsworth Products, Inc.
2. Commscope, Inc.
3. Ortronics by Legrand North America, LLC.
4. Or approved equal.

2.2 COMPONENTS

A. Regulatory Requirements

1. UL Listed for Grounding and Bonding Equipment (UL 467)
2. Trade Agreements Act (TAA) Compliant

B. Performance/Design Criteria

1. Capacities

a. Primary Bonding Busbar (PBB) formerly Telecommunications Main Grounding Busbar (TMGB)

1) Pre-drilled copper busbar with holes to accommodate standard sized lugs.
2) Minimum dimensions: 6 mm (0.25 in.) thick x 100 mm (4 in.) high x 510 mm (20 in.) long.
3) Hole pattern to accommodate two-hole lugs per the recommendation of NECA/BICSI 607-2011 and TIA-607-C.
4) Accommodate grounding lugs of 8 mm (5/16 in.) diameter with 16 mm (5/8 in.) hole centers and 11 mm (7/16 in.) diameter with 25 mm (1 in.) hole centers.
5) Have wall-mount stand-off brackets, assembly screws and insulators creating a 50 mm (2 in.) separation from the wall.

b. Secondary Bonding Busbar (SBB) formerly Telecommunications Grounding Busbar (TGB)

1) Pre-drilled copper busbar with holes to accommodate standard sized lugs.
2) Minimum dimensions: 6 mm (0.25 in.) thick x 50 mm (2 in.) high x 300 mm (12 in.) long.
3) Have one row with nine (9) attachment points for two-hole grounding lugs.
4) Hole pattern to accommodate two-hole lugs per the recommendation of NECA/BICSI 607-2011 and TIA-607-C.
5) Accommodate grounding lugs of 8 mm (5/16 in.) diameter with 16 mm (5/8 in.) hole centers and 11 mm (7/16 in.) diameter with 25 mm (1 in.) hole centers.
6) Have wall-mount stand-off brackets, assembly screws and insulators creating a 50 mm (2 in.) separation from the wall.

c. Bonding Conductors

1) Copper.
2) When insulated, listed for the application.
3) Sized at 6.5 kcmil/m (2 kcmil/ft) of conductor length.
4) Minimum bonding conductor size is 6 AWG.
5) Maximum size is 3 AWG.
6) Size bonding conductors per Figure 5.4.4.1 of TIA-607-C.
7) The bonding conductor insulation is green. If not insulated, permanently marked with green color.

d. Bonding Accessories

1) Two Mounting Hole Ground Terminal Block

a) Electroplated tin aluminum extrusion.
b) Accept conductors ranging from 14 AWG through 2 AWG.
c) The conductors are to be held in place by two stainless steel set screws.
d) Have two 6.4 mm (1/4 in.) holes spaced on 15.8 mm (5/8 in.) centers to allow secure two-bolt attachment to the rack or cabinet.
e) Ground terminal block must be UL Listed as a wire connector.

2) Compression Lugs

a) Electroplated tinned copper.
b) Have two holes spaced on 15.8 mm (5/8 in.) or 25.4 mm (1 in.) centers, as stated below, to allow secure two-bolt connections to busbars.
c) Sized to fit a specific size conductor, sizes 6 AWG to 4 AWG.
d) Compression lugs must be UL Listed as wire connectors.

3) Antioxidant Joint Compound

a) Oxide inhibiting joint compound for copper-to-copper, aluminum-to-aluminum or aluminum-to-copper connections.

4) Equipment Ground Jumper

a) 300 mm (24 in.) L insulated ground jumper with a straight two-hole compression lug on one end and an L-shaped two-hole compression lug on the other end.
b) Ground conductor is an insulated green/yellow stripe 6 AWG wire.
c) Lugs made from electroplated tinned copper and have two mounting holes spaces 13 mm (0.5 in.) to 16 mm (0.625 in.) apart that accept 6 mm (1/4 in.) screws.
d) UL Listed.

5) Accessory Products:

a) Provide any accessory products related to the copper connectors required to provide a complete and functional infrastructure system.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 INSTALLATION

A. Install as per:

1. The manufacturer's recommended installation instructions
2. ANSI/NECA/BICSI 568-2006
3. ANSI/BICSI/NECA-607
4. BICSI ITSIMM
5. NECA-1
6. NFPA 70

B. Wall-Mount Busbars

1. Attach busbars to the wall with appropriate hardware according to the manufacturer's installation instructions.
2. Make conductor connections to the TMGB or TGB with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
3. Attach each lug with stainless steel hardware after preparing the bond according to the manufacturer's recommendations and treating the bonding surface on the busbar with an antioxidant joint compound to help prevent corrosion at the bond.

C. Rack-Mount Busbars and Ground Bars

1. Add a rack-mount horizontal or vertical busbar or ground bar to each rack or cabinet.
2. Attach rack-mount busbars and ground bars to racks or cabinets according to the manufacturer's installation instructions.
3. Bond the rack-mount busbar or ground bar to the room's TMGB or TGB with appropriately sized hardware and conductor.

D. Ground Terminal Block

1. Bond every rack and cabinet to the local PBB or SBB.
2. Make the minimum bonding connection to racks and cabinets with a rack-mount two-hole ground terminal block sized to fit the conductor and rack and installed according to manufacturer recommendations.
3. Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.

E. Equipment Ground Jumper Kit

1. Bond equipment to a vertical rack-mount busbar or ground bar using ground jumper according to the manufacturer's recommendations.
2. Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or ground bar to help prevent corrosion at the bond.

3.4 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Site Tests and Inspections: Test the resistance to ground at each busbar to certify performance of the grounding and bonding system.

1. Verify that the grounding system resistance to ground does not exceed 5 ohms.
2. Measure using a four-terminal fall-of-potential method as defined in IEEE 81.
3. Measure with an un-energized electrical distribution system in normally dry conditions not less than 48 hours after the last rainfall.
4. Measure with an energized electrical distribution system in normally dry conditions not less than 48 hours after the last rainfall.

C. Nonconforming Work: Reinstall.

D. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

E. Waste Management: Recycle all detritus.

F. Protect the grounding and bonding system from subsequent construction operations.

END OF SECTION 270526

SECTION 270529 – HANGERS AND SUPPORTS FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes: non-continuous cable support components utilized to provide pathways support to telecommunications cables traveling outside cable trays, conduits, or other continuous cable supports.

B. Related Requirements:

1. Section 271513 “Communications Copper Horizontal Cabling”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

1. Submit coordinated detail drawings of the hanger system
2. Submit drawings showing field measured dimensions
3. Submit detail drawings of special accessory components not included in Manufacturer’s product data

C. Samples: Submit a sample for each component.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for Installer and Project Manager.

B. Product Certificates: for all products.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each product.

B. Warranty Documentation: For the system.

C. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cablofil by Legrand North America, LLC.
2. nVent Electric plc.
3. Panduit Corp.
4. Or approved equal.

2.2 SYSTEMS

A. Regulatory Requirements

1. As appropriate to the component:
2. UL Listed for the Support of Conduit, Tubing, and Cable (UL 2239)
3. Trade Agreements Act (TAA) Compliant

B. Performance/Design Criteria

1. Non-continuous cable supports are to be available in multiple sizes, styles, and materials.
2. Rigid supports with flared edges and pre-configured bend radius controls.
3. Provide drop wire supports and threaded rod assemblies in areas where structural mounting surfaces are non-functional or inaccessible.
4. Sling assemblies must provide a bearing surface of sufficient width to comply with required bend radii of high-performance twisted pair and optical fiber cables.
5. Support slings must have a static load limit of 45 kgs (100 lbs.).
6. Non-continuous cable supports sized 25 mm (1 in.), and larger must have a cable retainer strap to provide containment of cables within the hanger.
7. The cable retainer strap must be removable and reusable.
8. Select approved non-continuous cable supports suitable for specific installation environments and air handling (plenum) spaces.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 INSTALLATION

A. Install as per:

1. The manufacturer’s recommended installation instructions
2. ANSI/NECA/BICSI 568-2006
3. BICSI ITSIMM
4. NECA-1

B. Use non-continuous support in all locations where cables are not buried within the floor slab within ENT, supported by cable tray/ladder rack, or within conduit.

C. Follow manufacturer’s instructions and recommended industry standards and guidelines.

D. The non-continuous support system must be an independent support structure for the telecommunication system.

E. Draping cables over other structures in the ceiling is unacceptable.

F. Do not use water pipes, ceiling grid, sprinkler system, electrical supports, air ducts or any other in-ceiling structure may not be used for cable support.

G. Use supports to supplement the main cable support system when any cabling leaves the main support system or is unsupported for more than 1000 mm (3 ft).

H. Install non-continuous supports with ceiling wire or threaded rod secured to the slab above to support the telecommunications cable infrastructure parallel to the slab throughout the cable plant, unless site conditions dictate a non-parallel installation.

I. Route cable to follow existing corridors and parallel or 90-degree angles from all walls and the cable tray whenever possible.

3.4 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose

END OF SECTION 270529

SECTION 270533 – CONDUIT AND BACKBOXES FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes:

1. Conduit, fittings and bodies, including multi-cell conduit
2. Junction boxes, pull boxes and gutters
3. Measured pull tape

B. Related Requirements:

1. Section 270526 “Grounding and Bonding for Communication Systems”
2. Section 270553 “Identification for Communication Systems”
3. Section 271513” Communications Copper Horizontal Cabling”
4. Section 271543 “Communications Faceplates and Connectors”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details.

1. Include plans, elevations, sections, details, and attachments to other Work.

C. Samples: For each.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for Installer.

B. Product Certificates: for all products.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each product.

B. Warranty Documentation: For the system.

C. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt
4. Storage and Handling Requirements: Protect from moisture, falls and compaction
5. Packaging Waste Management: Recycle all materials

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Randl Industries, Inc.
2. Allied Tube and Conduit
3. Western Tube
4. Or approved equal.

2.2 COMPONENTS – TWISTED PAIR BACK BOX

A. Performance/Design Criteria

1. 127 mm x 127 mm x 72.5 mm (5 in. x 5 in. x 2.875 in.)
2. Side knockouts:

    a. One 25 mm (1 in.) on each side

3. Back knockout:

    a. One 13 mm (0.5 in.)

4. Integral cable management within the box
5. Galvanized steel

2.3 COMPONENTS – EXTENSION RING

A. Performance/Design Criteria

1. 127 mm x 127 mm x 13 mm (5 in. x 5 in. x 0.5 in.)
2. Galvanized steel
3. Extension ring for twisted pair back box to allow presentation of standard 106-style face plate

2.4 SYSTEMS

A. Regulatory Requirements

1. As appropriate to the component:

    a. UL Listed for Standard for Electrical Intermediate Metal Conduit – Steel (UL 1242)
    b. UL Listed for Conduit, Tubing and Cable Fittings (UL 514B)
    c. UL Listed for Hardware for the Support of Conduit, Tubing and Cable (UL 2239)
    d. UL Listed for Electrical Rigid Metal Conduit – Steel (UL 6)
    e. Trade Agreements Act (TAA) Compliant

B. Conduit Types

1. Rigid Metal Conduit (type RMC):

    a. A threadable raceway of circular Cross Section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.
    b. Comply with NEC Article 344

2. PVC Rigid Conduit (type PVC):

    a. A rigid nonmetallic conduit (RNC) of circular cross section, with integral or associated couplings, connectors and fittings for the installation of electrical conductors and cables.
    b. Comply with NEC Article 352.

3. Electrical Metallic Tubing (type EMT) Conduit:

    a. An unthreaded thin-wall raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed utilizing appropriate fittings.
    b. Comply with NEC Article 358.

C. Requirements

1. Fabricate conduit, fittings, and bodies to form a continuous support system for communications cables.
2. PVC-Coated Rigid Steel Conduit and Fittings: Follow NEMA RN1.
3. Rigid Steel Galvanized Conduit and Fittings Before Coating:

    a. Follow FS WW-C-581d, ANSI C80.1, and UL 6.
    b. Pass bending, ductility, and thickness of zinc coating in ANSI C80.1.

4. Nonmetallic Conduit and Fittings: Pass NEMA TC2, UL 651 and 651A and FS W-C-1094A. EMT fittings must be formed steel compression ring type. Die cast fittings are not allowed.
5. All conduits, fittings, junction and pull boxes must be UL Listed.
6. All conduits, fittings, junction and pull boxes must comply with the NEC.
7. Conduit Bodies: Not permitted.
8. Conduit Fittings

    a. All fittings must be compression or threaded.
    b. Fittings must provide a secure connection for pulling communications cables.
    c. Setscrew fittings are not permitted.

9. Conduit “condulets” are not permitted.
10. Non-metallic conduits are not permitted in above-ground installations. Conversion fittings are required for non-metallic (below ground) to metallic (above-ground) transitions.
11. Measured pull tape

    a. Pre-lubricated, woven polyester, low friction, and high abrasion resistant yarn.
    b. Minimum average tensile strength must be 54.43 kgs (1130 lbs.) for 38.1 mm (1.5 in.) and smaller conduits and innerduct.
    c. Minimum average tensile strength must be 816.46 mm (1800 lbs.) for conduits larger than 38.1 mm (1.5 in.).

12. Junction boxes, gutters, pull boxes:

    a. All junction boxes, gutters and pull boxes must comply with NEC Article 314.
    b. All junction boxes, gutters and pull boxes must meet the following minimum material requirements:

        1) 16-gauge steel or larger.
        2) Seams must be continuously welded and grounded smooth.
        3) Continuous hinge (where possible).

4) External screws and clamps.
5) External mounting feet (where possible).
6) Oil-resistant gasket and adhesive.
7) ANSI 61 gray polyester powder coating inside and out over phosphatized surface.
8) UL 50 type 12.

c. All junction boxes, gutters and pull boxes are to be provided with the following:

1) Proper knockouts for the required number of conduits.
2) Proper bushings for conduits and/or cabling.
3) A securely installed hinged access cover.

d. All junction boxes, gutters and pull boxes must be securely installed.
e. All junction and pull box sizes for single and multiple conduit-runs must comply with BICSI TDMM.
f. Gutter sizes for single conduit runs must comply with BICSI TDMM.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 PREPARATION

A. Surface Preparation

1. Verify conduit system is properly sized for cables (minimum one inch).
2. Verify general conduit route.
3. Verify substrates to which work is connected and determine detail requirements for proper support.
4. Verify proper location and type of rough-in for conduit terminations.

3.4 INSTALLATION

A. Install as per:

1. The manufacturer’s recommended installation instructions
2. ANSI/NECA/BICSI 568-2006

3. BICSI ITSIMM
4. NECA-1
5. NFPA 70

B. Locations and Types:

1. Install PVC-coated conduits in outdoor above-ground locations, inside valve vaults and wet wells, and in corrosive and wet environments.
2. Install PVC conduits in buried duct banks or encased in concrete. Use PVC-coated rigid steel elbows for stub outs.
3. Install exposed conduit parallel or perpendicular to lines of existing construction and grouped together where possible, without interfering with use of premises or working areas. Prevent safety hazards and interference with operating and maintenance procedures.
4. Conduit may pass through areas with temperature differential of 20 degrees F or more. Seal with proper fitting at barrier between areas of differing temperature.
5. Do not install conduit in interference with equipment placement or operation; piping; structural members; maintenance access; indicated future equipment.
6. Contractor is to coordinate with Drawings of other disciplines to determine availability of space for installation.

C. Conduit Sizing, Arrangement and Support:

1. Conduit fill must comply with TIA-569-C.
2. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for thirty percent additional conduits whenever possible.
3. Support un-encased conduit with clamps, hangers, straps and metal framing channel attached to building structure.
4. Arrange conduit supports to prevent alignment distortion by wire pulling operations. Fasten conduits using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
5. For conditions where existing supports are insufficient, install rigid support system, securely attached to building structural members only, plumb, level and in true alignment with related and adjoining work.
6. Support conduit 50.8 mm (2 in.) and larger at 3.05 m (10 ft.) on center maximum, and conduit 38.1 mm (1.5 in.) and smaller at 2.43 m (8 ft.) on center maximum.
7. Fasten 38.1 mm (1.5 in.) and smaller conduit to concrete, masonry or steel with either one-hole malleable iron conduit straps, or "Korn" clamps, or U-bolts; for larger diameters, use two-hole straps. Use "clamp backs" for strapping conduits to planar surfaces.
8. Provide PVC-coated or stainless-steel supports for PVC-coated conduit.
9. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
10. Allow minimum 6.35 mm (0.25 in.) clearance from vertical surfaces to prevent dirt and moisture buildup behind conduit.

D. Design Considerations:

1. Fabricate bends free of indentations or elliptical sections.
2. The minimum bend radius is six times the conduit ID for a 50.8 mm (2 in.) conduit or less.
3. The minimum bend radius is ten times the conduit ID for a conduit greater than 2 inches.

4. The minimum bend radius is eight times the conduit ID for a conduit supporting the TBB for a 50.8 mm (2 in.) conduit or less.
5. Below grade conduit must extend four inches AFF with a bushing.
6. Ceiling conduit or sleeves must extend four inches below the finished ceiling with a bushing.
7. All stubbed conduit ends must be provided with a ground bushing.
8. All conduit penetrations must be provided with the proper conduit sleeves.

    a. Sleeves must extend three inches AFF or four inches below the finished ceiling, with a bushing.
    b. Sleeves must be installed in the communications room floor or ceiling a minimum of 50.8 mm (2 in.) to 101.6 mm (4 in.) on center from the wall.
    c. Conduit floor sleeves must be spaced in increments to equal the conduit outside diameter from each other.
    d. Installed in a single tier or row from left to right horizontally.

        1) If two tiers or rows are required, the conduits are to be staggered between tiers.
        2) No more than two tiers or rows are permitted.

9. Cable support anchors are to be installed 457.2 mm (18 in.) to 609.6 mm (24 in.) above the sleeves.

    a. All conduit penetrations must comply with all City of New York, FDNY fire codes. All conduit penetrations in fire-rated walls or floors must be sealed and fire-proofed to at least the rating of the penetration area.
    b. Conduits are to be routed in the most direct route, with the fewest number of bends possible.
    c. There may be no continuous conduit sections longer than 30.48 m (100 ft.). For runs that total more than 30.48 m (100 ft.), insert junction or pull boxes (or gutters if appropriate) so that no continuous run between pull boxes is greater than 30.48 m (100 ft.)
    d. There may be no more than two 90-degree bends (180 degrees total) between conduit pull boxes.
    e. Terminate conduit in sheet metal enclosures. Outdoor enclosures must be furnished with threaded hubs. Side penetrations in the enclosure are not permitted.
    f. Changes in direction must be accomplished with sweeping bends observing minimum bend radius requirements above. Do not use pull boxes for direction changes unless specifically designated otherwise in the Drawings.
    g. Unless otherwise noted in the Drawings, conduits entering pull boxes must be aligned with exiting conduits.
    h. Pull boxes must be placed in readily accessible locations at a height to clear the ceiling grid with box door open.

E. Separation requirements – following are the minimum separation requirements between communications and power cables.

1. Unshielded power lines or electrical equipment in proximity to open or non-metal pathways:

    a. Less than 2 kVA – 127 mm (5 in.)
    b. 2 to 5 kVA – 304.8 mm (12 in.)
    c. Greater than 5 kVA – 609.6 mm (24 in.)

2. Unshielded power lines or electrical equipment in proximity to grounded metal conduit pathway:

a. Less than 2 kVA – 63.5 mm (2.5 in.)
b. 2 to 5 kVA – 152.4 mm (6 in.)
c. Greater than 5 kVA – 304.8 mm (12 in.)

3. Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal conduit pathway:

a. 2 to 5 kVA – 76.2 mm (3 in.)
b. Greater than 5 kVA – 152.4 mm (6 in.)

F. Installation:

1. Install conduit mechanically secure, mechanically protected from physical harm, electrically continuous, and neat in appearance. Ensure the interior of conduit is clean and smooth to permit pulling conductors without damage to insulation. Wrench- tighten threaded connections.
2. Cut conduit ends square, leaving a flat conduit face. Do not use plumbing pipe cutters.
3. Deburr ends.
4. Cut threads with standard conduit dies providing 19.05 mm (0.75 in.) taper per foot and of proper length to make joints and terminals tight and without deformation.
5. Use thread cutting oil continuously during threading. Remove metal cuttings and oil after cutting and before painting (if any).
6. Use non-corrosive coal tar enamel or zinc rich epoxy primer on threads of steel conduit before connection.
7. Use only strap wrenches to tighten joints in plastic coated rigid steel conduit. Replace conduit and fittings showing cuts, nicks and threader chuck jaw marks and other damage. Use solvent, or the same patching material, to seal around edges of conduit fitting covers.
8. Protect conduit terminations from mechanical damage, and prevent entry of moisture, dirt and foreign matter into the conduit system by properly capping terminations.
9. Fit conduit crossing structure expansion joints with approved expansion fittings and bonding jumpers.
10. Seal annular space at conduit penetrations through structures and pavement airtight and watertight.
11. Provide measured pull tape in all conduits and innerduct prior to cable installation. Measured pull tape is to be replaced with standard pull tape (non-measured) when each cable is installed.

G. Horizontal Conduit Routes

1. Horizontal Conduits

a. Horizontal (station) conduit is defined as the conduit run between the communications outlet and the cable tray or communications room as indicated on Drawings.
b. Each horizontal conduit run is to be a 25.4 mm (1 in.) metallic conduit and is to be home run from each communications outlet box to the equipment room, terminating equipment or cable tray, as indicated in Drawings.
c. Each route is to be installed with the least amount of conduit bends.
d. Each dual horizontal conduit run is to be provided with a junction or pull box every 30.48 m (100 ft.). The quantity of conduits entering the junction or pull box must equal the number of conduits exiting the junction or pull box.
e. Each terminating (outlet end) conduit connection must be provided with the proper connecting bushing fitting.

f. Each originating end (communications room end) must be provided with the proper connecting ground bushing fitting and properly bonded to ground.

2. Horizontal Junction/Outlet Boxes

a. Each horizontal conduit is to be terminated into an outlet box.
b. Each outlet box is to be a deep 101.6 mm (4 in.) square by 63.5 mm (2.5 in.) deep junction box with a minimum of two 25.4 mm (1 in.) knockouts on top, bottom and each of the sides.
c. Each conduit home run is to be provided with a deep 101.6 mm (4 in.) junction box (w/cover) at 30.48 m (100 ft.) intervals and 152.4 mm (6 in.) above each ceiling and wall intersection.

3. Horizontal conduit entrance in communications rooms – wall entry

a. Horizontal conduits must enter the communications room wall 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray.
b. Conduit wall stubs is to be spaced in increments equal to the conduit OD from each other.
c. All conduit wall stubs are to be extended to the terminating equipment, electronics, or cable tray, as noted in Drawings.
d. Conduit crossovers are not permitted.

4. Horizontal conduit entrance in communications rooms – ceiling entry

a. Horizontal conduits must enter or be extended from the equipment room ceiling 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray.
b. Ceiling conduit stubs are to be spaced in increments equal to the conduit OD from each other.
c. All ceiling conduit stubs are to be extended to the terminating equipment, electronics, or cable tray, as noted in Drawings.
d. Conduit crossovers are not permitted.

5. Horizontal conduit entrance in communications rooms – floor entry

a. Horizontal conduits are to enter the communications room floor two inches to four inches on center from the wall and are to be stubbed 152.4 mm (6 in.) AFF.
b. Conduit floor stubs are to be spaced in increments equal to the conduit OD from each other.
c. All conduit floor stubs are to extend to the terminating equipment, electronics, or cable tray, as noted in Drawings, by routing up the wall, between the wall and the wall-mounted cable tray side rail, and extending 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray.
d. Conduit crossovers are not permitted.

6. Horizontal conduit-to-cable tray

a. Only the terminating end of horizontal communication conduits may be attached to the cable tray.
b. Non-communications conduit may not be attached to the cable tray in any fashion.
c. Conduit terminating end may be attached to cable tray side rail with “conduit-to-cable tray” clamps. No other form of attachment are permitted.
d. Top or bottom cable tray conduit feeds and attachments are not permitted.

7. Riser Conduit Routes

a. Riser conduit entrance in communications rooms – wall entry

1) Riser conduits will enter the communications room wall a minimum of 609.6 mm (24 in.) above the top of the cable tray.
2) Conduit wall stubs are to be spaced in increments to equal the conduit OD from each other.
3) Riser conduits are to be installed in a single tier or row from left to right horizontally.

a) If two tiers or rows are required, the conduits must be staggered between tiers.
b) No more than two tiers or rows are permitted.

b. All conduit wall stubs are to extend to and over the cable tray to access cable tray pathway.
c. All riser conduit stubs are to be provided with the proper universal drop-out/ waterfall cable exit runway, which will be supported by and mounted to channel strut.
d. Conduit crossovers are not permitted.
e. Riser conduit entrance in communications rooms – floor entry

1) Riser conduits are to enter the communications room floor 50.8 mm (2 in.) to 101.6 mm (4 in.) on center from the wall and stub up 152.4 mm (6 in.) AFF.
2) Conduit floor stubs are to be spaced in increments to equal the conduit OD from each other.
3) Riser conduits are to be installed in a single tier or row from left to right horizontally.

a) If two tiers or rows are required, the conduits must be staggered between tiers.
b) No more than two tiers or rows are permitted.

8. Exiting cable is to extend to the bottom of the cable tray and be provided with cable support anchors and secured with supporting hardware every 152.4 mm (6 in.) above the conduit bushings.
9. Conduit floor stubs are to be extended to the terminating equipment, electronics, or cable tray, only when noted in Drawings. When required conduits are to be routed up the wall, between the wall and the wall-mounted cable tray side rail and extended 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray.
10. The riser cable is to be extended in the cable tray to the terminating equipment, as noted in the Drawings.
11. Conduit crossovers are not permitted.
12. All metallic conduits are to be grounded to the telecommunications ground bus bar at each end.

H. Multi-Cell Raceway

1. All multi-cell galvanized steel entry conduit stubs are to be transitioned to multi-cell EMT egress conduit.
2. All multi-cell galvanized steel conduit room stubs are to be transitioned to multi-cell EMT conduit using the proper metallic connecting fittings.
3. Within the communications rooms, only non-metallic Riser Gard innerduct are to be extended from the conduit stub to the terminating equipment.
4. Manufacturer’s non-metallic connecting fitting must be used at all connections.

3.5 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose.

END OF SECTION 270533

SECTION 270536 – CABLE TRAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Provides specifications for cable tray (ladder rack and basket type) containment systems to provide pathways support to telecommunications cables traveling outside of non-contiguous cable support systems (J-hooks) and conduits.

B. Related Requirements:

1. Section 270526 Grounding And Bonding For Communications Systems.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Submit all product data in accordance with DDC General Conditions.
2. Product data to include, but not limited to materials, finishes, approvals, load ratings, and dimensional information.
3. Submit product data and samples of anchoring device and narrative of installation procedure.

B. Shop Drawings:

1. Shop drawings are to depict cable tray routes, types, dimensions, support points, finishes and calculations determining support spans and load ratings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Manufacturer:

1. Component manufacturers must be ISO 9001:2000 and offer products that are RoHS compliant.
2. All items of a given type must be the products of the same manufacturer.
3. Cable trays components and systems must be classified by Underwriters Laboratories (UL)

4. Cable trays components and systems must be of uniform quality and appearance.

B. Product Certificates: For all products.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: For each product

B. Operation and Maintenance Data: For each product

C. Warranty Documentation: For the system

D. Project Record Documents: Record actual routing of cable tray and locations of supports.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chatsworth Products, Inc.
2. Commscope, Inc.
3. Ortronics by Legrand North America, LLC.
4. Or approved equal.

2.2 BASKET CABLE TRAY SECTIONS AND COMPONENTS (where drawings indicate cable tray and/or basket tray)

A. Description:

1. Wire basket is to be made of high strength steel wires and formed into a standard 2 inch by 4 inch 2-inch-deep x 6- or 12-inch-wide wire mesh pattern with intersecting wires welded together.
2. All mesh sections must have at least one bottom longitudinal wire along entire length of straight section.
3. Wire basket tray sizes must conform to the following nominal criteria:
4. Straight sections are to be furnished in standard 118-inch lengths.

5. Wire diameter is to be 0.196” (5mm) minimum on all mesh sections.
6. Wire tray to be provided in the sizes indicated on the drawings.
7. The system is to be installed as an Equipment Ground Conductor (EGC), all splicing assemblies are to be UL Classified or CSA approved as an EGC. Powder coated wire mesh cable tray must have paint completely removed at all contact points of splice/ground bolt attachments.
8. Wire basket try is to be powder coated black with an average paint thickness of 1.2mils (30microns) to 3.0mils (75microns).
9. All fittings are to be field formed, from straight sections, in accordance with manufacturer’s instructions.
10. The Contractor must be a certified installer and provide documented proof for the wire basket try system.
11. All fittings are to be field formed, from straight sections in accordance with manufacturer’s instructions.
12. Wire basket cable tray supports are to be center support hangers, trapeze hangers or wall brackets.

2.3 LADDER RACK SECTIONS AND COMPONENTS

A. Description:

1. Ladder rack is to be manufactured from 3/8” (9.5 mm) wide by 1-1/2” (38 mm) high tubular steel with .065” (1.65 mm) wall thickness.
2. Provided in widths indicated on the drawings.
3. Side stringers: 9’-11½ “(3.0 m) long.
4. Welded cross members between stringers on 6” (300 mm) intervals/centers beginning 5-3/4” (146 mm) from one end.
5. Furnish manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.
6. UL Classified.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 INSTALLATION BASKET TRAY

A. Install wire basket tray in accordance with NEMA VE 2 to ensure that the cable tray equipment complies with the requirements of NEC, and applicable portions of NFPA70B and NECA's "Standard of Installation" pertaining to general electrical installations practices.

B. Provide wire basket of types and sizes indicated, with connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the following additions construction features.

C. All trays should be supported using a minimum of ¼' All Threaded Rod (ATR).

D. Special accessories are to be furnished as required to protect, support and install a wire basket support system.

E. Coordinate wire basket with other electrical work as necessary to properly interface installation of wire basket runway with other work.

F. Support trays and fasten to structure and finishes in accordance with Section 270529 – "Hangers and Supports for Communications Systems". Install supports at each connection point, at end of each run, and at other points to maintain spacing between supports of 6 ft maximum.

G. Install expansion connectors where recommended by manufacturer.

H. Install firestopping by a Listed and Approved method to sustain ratings when passing cable tray through fire-rated elements.

I. Ground and bond metal cable tray in accordance with Section 270526 – "Grounding and Bonding for Communications Systems".

J. Provide continuity between tray components.

K. Use antioxidant compound to prepare contact surfaces before assembly.

L. Install two 6AWG bare copper equipment grounding conductor through entire length of tray and bond to each component.

M. Make connections to tray using mechanical, compression or exothermic connectors.

3.4 INSTALLATION LADDER RACK

A. Installation and configuration is to conform to the requirements of the ANSI/ EIA/TIA Standards 568A & 569, NFPA 70 (National Electrical Code).

B. Runway should be supported every 4 feet on center with minimum 5/8-inch diameter threaded rod, or applicable support brackets or racks.

C. Install metal cable tray in accordance with NEMA VE 2.

D. Install fiberglass cable tray in accordance with NEMA FG 1.

E. Support trays and fasten to structure and finishes in accordance with Section 270529 – "Hangers and Supports for Communications Systems". Install supports at each connection point, at end of each run, and at other points to maintain spacing between supports of 4 feet maximum.

F. Install expansion connectors where recommended by manufacturer.

G. Install firestopping by Listed and Approved means to sustain ratings when passing cable tray through fire-rated elements.

H. Ground and bond metal cable tray in accordance with Section 270526 – "Grounding and Bonding for Communications Systems".

3.5 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose.

END OF SECTION 270536

SECTION 270544 -SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes: Penetration methods into and through fire-rated and unrated walls, ceilings, and floors.

1. Sleeves for pathway and cable penetrations
2. Sleeve-seal systems
3. Sleeve-seal fitting
4. Grout
5. Silicone sealants

B. Related Requirements

1. Section 270533 Conduit and Backboxes for Communication Systems
2. Section 270536 Cable Trays for Communications Systems
3. Section 271123 Cable Management and Ladder Rack

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.

B. Product Certificates: For all Products.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hilti, Inc.
2. Specified Technologies Inc.
3. 3M
4. Or approved equal.

2.2 SLEEVES

A. Wall Sleeves

1. Steel Pipe Sleeves: ASTM A 53/A 53M
2. Cast-Iron Pipe Sleeves

B. Sleeves for Conduits penetrating non-fire-rated gypsum board assemblies:

1. Galvanized-steel sheet round tube closed with a welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered cup-shaped and smooth outer surface with nailing flange for attaching to wooden forms.

2.3 SLEEVE-SEAL SYSTEMS

A. Regulatory Requirements

1. UL 1479

B. Performance/Design Criteria

1. Modular sealing device, designed for field assembly to fill annular space between sleeve and pathway or cable.

C. Materials

1. Sealing elements: EPDM rubber interlocking links shaped to fit the surface of the pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel
3. Connecting bolts and nuts: Carbon steel, with a corrosion-resistant coating, of the length required to secure pressure plates to sealing elements.

D. Fabrication

1. Shop Fabrication

2.4 SLEEVE-SEAL FITTINGS

A. Regulatory Requirements

1. UL 1479

B. Performance/Design Criteria

1. Manufactured plastic, sleeve-type, water-stop assembly made for embedding in concrete slab or wall.
2. Unit are to have plastic or rubber water-stop collar with a center opening to match piping OD.

2.5 FIRE-RATED WIRING DEVICES

A. Regulatory Requirements

1. UL 1479

B. Performance/Design Criteria

1. Include both internal and external firestopping.
2. Capable of allowing a 0 to 100 percent visual fill of cables.
3. Sufficient size to accommodate the quantity and size of data cables required and be suitable for use with new or existing cable installations.

4. In normal use, the device will require no maintenance and will accommodate future cable changes without mechanical adjustment and/or removal or replacement of protective materials.
5. Have steel wall plates allowing for single or multiple devices to be ganged together.
6. Be modular.
7. Provide mechanical installation options for common wall and floor constructions as well as common construction conditions including over-sized or damaged openings or existing sleeves.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 INSTALLATION

A. Install as per:

1. The manufacturer’s recommended installation instructions
2. BICSI ITSIMM
3. NECA-1
4. NEMA VE 2
5. NFPA 70

B. Sleeve Installation for Non-fire-rated electrical penetrations

1. Comply with NECA 1
2. Comply with NEMA VE 2 for cable tray and cable penetrations.
3. Install per the manufacturer’s recommendations.
4. Sleeves for conduits penetrating above-grade non-fire-rated concrete and masonry-unit floors and walls:

    a. Interior penetrations of non-fire-rated walls and floors

        1) Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for the size, depth, and location of joint.
        2) Seal space outside of sleeves with mortar or grout.
        3) Pack sealing material solidly between sleeve and wall, so no voids remain.
        4) Tool exposed surfaces smooth; protect material while curing.

b. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
c. Size pipe sleeves to provide 6.4 mm (~ 25 in.) annular clear space between sleeve and pathway or cable unless installing sleeve-seal.
d. Install sleeves for wall penetrations unless using core-drilled holes or formed openings.
e. Install sleeves during erection of walls.
f. Cut sleeves to length for mounting flush with both surfaces of walls.
g. Deburr after cutting.
h. Install sleeves for floor penetrations.
i. Extend sleeves in floor 50 mm (~ 2 in.) above finished floor level.
j. Install sleeves during erection of floors.

5. Sleeves for conduits penetrating non-fire-rated gypsum board assemblies.

a. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
b. Seal space outside of sleeves with approved joint compound for gypsum board assemblies

6. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.
7. Aboveground, exterior-wall penetrations

a. Seal penetrations using steel pipe sleeves and mechanical sleeve seals.
b. Select sleeve size to allow 25 mm (~1 in.) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

8. Underground, exterior-wall and floor penetrations

a. Install cast-iron pipe sleeves.
b. Size sleeves to allow for 25 mm (~ 1 in.) annular clear space between pathway or cable and sleeve for installing the sleeve-seal system.

9. Sleeve-seal-system installation

a. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at pathway entries into the building.
b. Install type and number of sealing elements recommended by the manufacturer for pathway or cable material and size.
c. Position pathway or cable in the center of the sleeve
d. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve.
e. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

10. Sleeve-seal-fitting installation

a. Install sleeve-seal fittings in new walls and slabs during their construction.
b. Secure nailing flanges to concrete forms.
c. Using grout, seal the space around outside of sleeve-seal fittings.

11. Fire-rated wiring devices installation

    a. Apply the factory supplied gasket material before the installation of the wall plates.

3.4 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Site Tests and Inspections:

    1. Verify that the sleeve or sleeve system is installed as per manufacturer's instructions.

C. Nonconforming Work: Reinstall.

D. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

E. Waste Management: Recycle all detritus.

F. Protect the grounding and bonding system from subsequent construction operations.

END OF SECTION 270544

SECTION 270553 – IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Identification of the various components of the telecommunication infrastructure and pathway system

B. Related Requirements:

1. Section 270533 “Conduit and Backboxes for Communication Systems”
2. Section 271116 “Communications Cabinets, Racks, Frames and Enclosures”
3. Section 271119 “Communications Termination Blocks and Patch Panels”
4. Section 271126 “Communications Rack Mounted Power Protection and Power Strips”
5. Section 271513 “Communications Copper Horizontal Cabling”
6. Section 271543 “Communications Faceplates and Connectors”
7. Section 272133 “Data Communications Wireless Access Points”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work, including:

1. Telecommunication Administration Schema.
2. Indicate the location of each type of label.

C. Samples: Submit a sample of each label type applied to a sample of the finished surface.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Technical Data Sheet for each installed label type.
2. Cleaning solution guide detailing cleaning solutions which one can and cannot use on the labels.

B. Warranty Documentation: For the system.

C. Record Documentation:

1. Record drawings indicating the location of all the components and component identification.
2. Provide floorplan drawings showing outlet identification numbering.
3. Provide equipment elevation drawings of all racks, cabinets, and wall field locations showing termination identification numbering.
4. For each separate label type, describe the machine, machine settings, label type and any other pertinent information to reproduce the label.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation
2. Panduit Corp
3. 3M
4. Or approved equal.

2.2 SYSTEMS

A. Regulatory Requirements:

1. UL Listed for Sealing, Wrapping and Marking Equipment (UL 963).
2. Trade Agreements Act (TAA) Compliant.

B. Performance/Design Criteria:

1. All labels are to be machine-manufactured by a labeling machine.
2. No handwritten labels will be acceptable as part of the final labeling scheme.
3. Be TIA- 606-C compliant.
4. It is the responsibility of the contractor to acquire, understand, and utilize the Commissioner's labeling scheme for all components of the voice data communications system.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions:

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 PREPARATION

A. Surface Preparation

1. Clean telecommunication spaces before installing equipment:

a. Vacuum the space's surfaces.
b. Apply a microfiber cloth to all surfaces working from the top surfaces to the bottom from the farthest position in the room to the exit of the room.
c. Install sticky dust at the immediate entrance to the room.

2. Prepare label installation surface:

a. Clean the application surface immediately before applying the label to improve adhesion.
b. Use a halogen-free, non-flammable cleaner approved by the label manufacturer.

3.4 INSTALLATION

A. Cable (Sheath):

1. Provide machine printed label directly to cable sheath, a minimum 75 mm (~ 3 in.) from each end of the cable sheath.
2. Cable identification numbers are to include a unique identifier indicating cable type and a sequential number.
3. Every cable identification number must be unique.

B. Workstation cords:

1. For all fixed, application specific workstation cords provide a label at the non-outlet end of the cord, i.e. wireless access points, video cameras, intercoms, etc.
2. Provide machine printed label directly to cable sheath, a minimum 75 mm (~ 3 in.) from the jack connecting to the edge device.
3. Cable identification to be the telecommunication outlet ID.

C. Telecommunications Outlets:

1. Provide machine printed label on each telecommunication outlet indicating outlet identification number.
2. Use labeling products from faceplate manufacturer if available, including a plastic window to protect label.
3. If individual jack labels (1,2,3… or A, B, C…, etc.) are not part of the molded construction of the outlet faceplate, provide machine printed labels adjacent to jack installed in the faceplate.

D. Termination Hardware:

1. Label termination hardware using numbering identification scheme compliant with TIA-606-C.
2. Install labels following connecting hardware manufacturers' instructions.
3. When the connecting hardware manufacturer does not provide labeling, install labeling using the following guidelines:

    a. Install where it will be most visible by cabling or network technician standing in front of the hardware.
    b. Where it is best illuminated by overhead lighting.
    c. Where it is least likely to be obstructed by patch cords.
    d. Where it is not obstructed by hinged or removable connecting hardware covers.

E. Rack Labeling:

1. Label all racks shown on drawings with an engraved plastic label.
2. Label top of equipment racks, front and back.
3. Label the side of the rack when it is the first or last in a bay of two or more and does not directly abut a wall.

F. Cabinet Labeling:

1. Label all cabinets shown on drawings with engraved plastic labels.
2. Turnover, to The Commissioner, all labels for cabinets not purchased under this contract for installation by others.
3. Label top of cabinets, front and back.
4. Label the side of the cabinet when it is the first or last in a bay of two or more and does not directly abut a wall.
5. Install cabinet side labels at the top of the cabinet.
6. Do not apply a label to removable cabinet doors or side panels.
7. Label the side of the cabinet when it is the first or last in a bay of two or more and does not directly abut a wall.

G. Box file:

1. Plastic storage box.

H. IT Equipment:

1. Label front and back of IT Equipment.

I. Label IT Equipment power cord:

1. Label peripheral devices such as KVM.

J. Pull boxes:

1. Label all pull boxes with engraved plastic labels.

K. Conduit:

1. Label all horizontal conduit larger than trade size 2.

L. Cable tray:

1. Label all cable trays.

M. Buried services:

1. Lay detectable marking tape on top of all buried services.
2. Install domed posts across the route of all buried services.
3. Label cable at every handhole.

3.5 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect installed labels from subsequent construction operations.

END OF SECTION 270553

SECTION 270800 – TESTING AND CERTIFICATION OF COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes: Requirements for all Structured Cabling System (SCS) testing, including certification and documentation of all test results to confirm the installed connectivity system complies with industry standards and specific category and performance ratings.

B. Related Requirements:

1. Section 270553 “Identification for Communication Systems”
2. Section 271119 “Termination Blocks and Patch Panels”
3. Section 271513 “Communications Copper Horizontal Cabling”
4. Section 271543 “Communications Faceplates and Connectors”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Certificates: Calibration and service record of each certification test device.

C. Provide proof that the test device calibration is within the Manufacturer’s recommended period.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for installer and testing personnel.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Record Documentation:

1. Present all test results verifying the installed link, permanent link and channel performance parameter results for all cable types at least one (1) week before the placement of any active electronics in telecommunication spaces.
2. The test result submittal must contain the following:

    a. Testing, verification, and documentation of all performance specification parameters for data cables in all telecommunication spaces.
    b. Identify the types of cable test device(s) and interface adapters used during testing and certification when presenting the results for each type of cable and each test procedure.
    c. Print directly from the testing device software application in both paper and electronic.
    d. Present paper results in a three (3) ring binder, sectioned according to floor and cable type.

        1) Where applicable:

            a) OSP
            b) ISP
            c) Copper horizontal
            d) Copper backbone
            e) Optical fiber cable horizontal
            f) Optical fiber cable backbone

    e. Present electronic results on a USB drive in the testing device's native file type with a copy of the electronic software used to generate the test results.

3. The last calibration/service record of each certification test device.

B. Copper Test Results Documentation

1. Transfer the test results/measurements into a Microsoft Windows-based database utility that allows for the maintenance, inspection and archiving of these test records.
2. Guarantee that the measurement results transfer to the USB drive unaltered (i.e., as saved in the test device) at the end of each test and that these results cannot be modified at a later time.
3. The database for the completed job is to be stored and delivered on USB including the software tools required to view, inspect, and print any selection of test reports.
4. Provide a PDF of the test results:

    a. The identification of the link per the naming convention defined in Section 270553 – "Identification for Communications Systems".
    b. The overall pass/fail evaluation of the link-under-test including the NEXT Headroom (overall worst-case) number.
    c. The date and time the test results were saved in the memory of the test device.

5. General Information to be provided in the electronic database with the test results information for each link:

a. The identification of the customer site as specified by the end-user.
b. The identification of the link per the naming convention defined in the overall system documentation.
c. The overall pass/fail evaluation of the link-under-test.
d. The name of the standard selected to execute the stored test results.
e. The cable type and the value of NVP used for length calculations.
f. The date and time the test results were saved in the memory of the test device.
g. The brand name, model and serial number of the test device.
h. The identification of the test device interface.
i. The revision of the test device software and the revision of the test standards database in the test device.
j. Length:

    1) Identify the wire-pair with the shortest electrical length, the value of the length rounded to the nearest 100 mm (~ 4 in.) and the test limit value.

k. Propagation delay:

    1) Identify the pair with the shortest propagation delay, the value measured in nanoseconds (ns) and the test limit value.

l. Delay Skew:

    1) Identify the pair with the largest value for delay skew, the value calculated in nanoseconds (ns) and the test limit value.

m. Insertion Loss (Attenuation):

    1) Minimum test results documentation as explained in Part 2 for the worst pair.

n. Return Loss:

    1) Minimum test results documentation as explained in Part 2 for the worst pair as measured from each end of the link.

o. NEXT, ACR-F:

    1) Minimum test results documentation as explained in Part 2 for the worst pair combination as measured from each end of the link.

p. PS-NEXT and PS ACR-F:

    1) Minimum test results documentation as explained in Part 2 for the worst pair as measured from each end of the link.

q. DC Loop Resistance.
r. DC Resistance Unbalance.
s. Plot Data.

C. Optical Fiber Test Results Documentation

1. Transfer test results saved within the field test instrument onto a USB drive formatted for use in a standard PC.
2. Do not save the test results as CSV.
3. Contain the following information:

a. The identification of the customer site as specified by the end-user.
b. The name of the test limit selected to execute the stored test results.
c. The name of the personnel performing the test.
d. The date and time the test results were saved in the memory of the test device.
e. The manufacturer, model and serial number of the field test instrument.
f. The version of the test software and the version of the test limit database held within the test instrument.
g. The fiber identification number.
h. The length for each optical fiber.
i. The index of refraction used for length calculation when using a length capable OLTS.
j. OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (the difference between the measured attenuation and the test limit value).
k. The overall pass/fail evaluation of the link-under-test for OLTS measurements.
l. A picture or image of each fiber end-face and a pass/fail status of the end-face based upon visual inspection.

D. Software:

1. Any specialist software necessary to view, inspect, and print any selection of test results or report in the testing device's native file type.
2. Licenses.
3. Subscriptions.
4. Software and Firmware Operational Documentation.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Ambient Conditions: Do not conduct any testing for certification of copper cabling until the electrical power for the entire site is live and operational.

PART 2 - PRODUCTS

2.1 COPPER CABLE TEST DEVICE

A. Product Options

1. Select analyzer to comprehensively certify each category rated connection and record results verifying compliance with TIA performance specifications to meet the category rating of the system.
2. Select analyzer as per the requirements of the cabling manufacturer specified within section 271513 – "Communications Copper Horizontal Cabling".

B. Performance/Design Criteria

1. Capacities

   a. Must comply with the accuracy requirements for field test device as defined in ANSI/TIA-1152.
   b. Must meet or exceed TIA Level IV compliant network cable testing device certification by an independent laboratory, such as Intertek, for verification of high speed, TIA-568 compliant cables.
   c. Copper test equipment capable of certifying Category-3, Category-5e, Category-6, Category-6A, Category 7 and Category 8 UTP/ScTP links or channels independent of termination hardware configuration (8P8C, jack or 110-style) for each level of performance.
   d. Provide full two-way auto test of Category-3, 5E, 6, 6A, 7 and 8 twisted-pair links.
   e. Store full frequency sweep data for all tests and print color graphical reports for all swept measurements.
   f. Be within the device test manufacturer's recommended calibration period.
   g. The test device including the appropriate interface adapter must meet the specified accuracy requirements for the permanent link test configuration (baseline accuracy plus adapter contribution) as specified in ANSI/TIA-1152.
   h. The 8P8C test plug must fall within the values specified in ANSI/TIA-568-D.2 for NEXT, FEXT and Return Loss.
   i. The adapter cord cable cannot be of twisted-pair construction.

2. Be capable of conducting the following tests as per ANSI/TIA-568-D.2

   a. Wire Map:

      1) If test device determines wiring is correct reports pass.
      2) Include the continuity of the shield connection if present.

   b. Length:

      1) Capable of measuring the length of all pairs of a basic link or channel based on the propagation delay measurement and the average value for NVP.
      2) Calculate the physical length of the link using the pair with the shortest electrical delay.
      3) Report and use for making the pass/fail decision.
      4) The pass/fail criteria are based on the maximum length allowed for the Permanent Link configuration (90 m (~ 295 ft)) plus 10 percent to allow for the variation and uncertainty of NVP.

   c. Insertion Loss (Attenuation):

      1) Test through the required frequency range in maximum step size of 1 MHz.

2) Measure insertion loss at the same frequency intervals as NEXT Loss to provide a more accurate calculation of the ACR parameter.
3) Minimum test results documentation (summary results):

a) Identify the worst wire-pair (1 of 4 possible).
b) The test results for the worst wire-pair must show the highest attenuation value measured (worst-case), the frequency at which this worst-case value occurs, and the test limit value at this frequency.

d. NEXT Loss:

1) Test pair-to-pair NEXT loss for each wire-pair combination from each end of the link (a total of 12 pair combinations).
2) Measure through the required frequency range.
3) Does not exceed the maximum step size for NEXT Loss measurements as defined in ANSI/TIA-568-D.2 Table 1.
4) Minimum test results documentation (summary results):

a) Identify the wire-pair combination that exhibits the worst-case NEXT margin and the wire-pair combination that exhibits the worst value of NEXT (worst-case).
b) Include the frequency at which it occurs as well as the test limit value at this frequency.

e. PS-NEXT Loss:

1) Evaluate and report for each wire-pair from both ends of the link-under-test (a total of eight results).
2) Evaluate through the required frequency range, and the step size may not exceed the maximum step size defined in ANSI/TIA-568-D.2 as shown in Table 1.
3) Minimum test results documentation (summary results):

a) Identify the wire-pair that exhibits the worst-case margin and the wire-pair that exhibits the worst value for PS-NEXT.
b) Identify for the tests performed from each end.
c) Include the frequency at which it occurs as well as the test limit value at this frequency.

f. ACR-F, pair-to-pair:

1) Measure for each wire-pair combination from both ends of the link-under-test.
2) Measure through the required frequency range, and the maximum step size for FEXT Loss measurements may not exceed the maximum step size defined in ANSI/TIA-568-D.2 as in Table 1.
3) Minimum test results documentation (summary results):

a) Identify the wire-pair combination that exhibits the worst-case margin and the wire-pair combination that exhibits the worst value for ACR-F.

4) Identify for the tests performed from each end.
5) Include the frequency at which it occurs as well as the test limit value at this frequency.

g. PS ACR-F Loss:

1) Minimum test results documentation (summary results):

a) Identify the wire-pair that exhibits the worst pair combinations for the tests performed from each end.
b) Include the frequency at which it occurs as well as the test limit value at this frequency.

h. Return Loss:

1) Measure from both ends of the link-under-test for each wire-pair.
2) Measure through the required frequency range in frequency increments that do not exceed the maximum step size defined in ANSI/TIA-568-D.2 as shown in Table 1.
3) Minimum test results documentation (summary results):

a) Identify the wire-pair that exhibits the worst-case margin and the wire-pair that exhibits the worst value for Return Loss.
b) Identify the wire pairs for the tests performed from each end.
c) Include the frequency at which it occurs as well as the test limit value at this frequency.

i. Propagation Delay:

1) Perform for each of the four wire pairs.
2) Minimum test results documentation (summary results):
3) Identify the wire-pair with the worst-case propagation delay.
4) Include the propagation delay value measured as well as the test limit value.

j. Delay Skew - as defined in ANSI/TIA-568-D.2:

1) Minimum test results documentation (summary results):
2) Identify the wire-pair with the worst-case propagation delay (the longest propagation delay).

a) The report must include the delay skew value measured as well as the test limit value.

k. DC Loop Resistance

1) Not to exceed 6.4 Ohm for all four pairs.
2) Minimum test results documentation (summary results):

a) Identify DC Loop Resistance.

l. DC Resistance Unbalance

1) Not to exceed 120 milliohms or 7.5 percent whichever is greater.
2) Report DC Resistance Unbalance for the following pairs:

a) 1,203,6
b) 1,2-4,5
c) 1,2-7,8
d) 3,6-4,5
e) 3,6-7,8
f) 4,5-7,8

3) Minimum test results documentation (summary results):

a) DC Resistance Unbalance.

4) Alien Crosstalk

a) Sampling size as per ISO/IEC 14763-2.

2.2 OPTICAL FIBER TEST DEVICE

A. Product Options

1. Select analyzer to comprehensively certify each optical fiber connection and record results verifying compliance with TIA performance standards and manufacturer specifications.
2. Select analyzer as per the requirements of the cabling manufacturer specified within section 271513 – "Communications Copper Horizontal Cabling".

B. Performance/Design Criteria

1. Capacities

a. The optical fiber source must permit full end-to-end testing of multimode, Single-mode and LOMMF optical fiber cabling fully compliant with industry standards and manufacturer recommendations.
b. Available source types and wavelengths are as follows:
c. Multimode - 850nm LED, and 1300nm LED.
d. Single-mode – 1310nm FP Laser and 1550nm FP Laser.
e. LOMMF – 850nm VCSEL and 1310nm FP Laser.
f. The built-in power meter is to be calibrated to read 850, 1310 and 1550nm wavelengths.
g. All test equipment must be capable of storing full frequency sweep data for all tests and printing graphical color reports for all swept measurements.
h. Within the calibration period recommended by the test device's manufacturer to achieve the manufacturer's specified measurement accuracy.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this Section.

B. Evaluation and Assessment

1. Verify that all telecommunications cabling is installed and supported, terminated, mounted in an appropriate housing or terminated on the applicable component and labeled before certification testing and documentation.
2. Verify that all outlets, cables, patch panels, and associated components are fully assembled and labeled before field testing.
3. Redo any testing performed on incomplete systems.

3.3 PREPARATION

A. Ensure that field test instruments have the latest software and firmware installed.

B. Verify certification test device universal interface adapters and manufacturer patch cords that enable permanent link verification are in new condition are do not indicate any twisting or kinking resulting from incorrect storage of the test device interface adapters.

C. Inspect optical fiber patch cords and ensure that connector surfaces are clean and free of defects.

3.4 TESTING (APPLICABLE TO ALL CABLE PLANT)

A. Certification test 100 percent of the installed cabling plant.

B. Follow manufacturers' instructions and recommended industry standards and guidelines to complete all TIA/EIA testing procedures to verify performance levels.

C. Follow manufacturer requirements for self-calibration procedures.

D. Follow BICSI ITSIMM.

E. Ensure circuit/cable IDs reported by the test instrument match the printed label ID.

F. Update test device software to show specific project information including but not limited to:

1. Date and time of testing.
2. Project name.
3. Field technician's name.
4. Cable identification number.
5. Cable manufacturer, type and part number.

3.5 COPPER CABLE TESTING

A. Test every cabling link in the installation in accordance with the field test specifications defined in ANSI/TIA-568-D.2.

B. To pass the test, all measurements (at each frequency in the required frequency range) must meet or exceed the limit value determined in ANSI/TIA-568-D.2.

C. Test each cable for:

1. Wire Map
2. Length
3. Insertion Loss
4. NEXT (Near-end Crosstalk) Loss
5. PS-NEXT (Power sum Near-end Crosstalk) Loss
6. ACR-F Loss
7. PS ACR-F Loss
8. Return Loss
9. Propagation Delay
10. Delay Skew
11. DC Loop Resistance
12. Alien Crosstalk

D. Test the installed twisted-pair horizontal links the point of termination in the telecommunications space to the telecommunication outlet in the work area for compliance with the Permanent Link performance specification as defined in ANSI/TIA-568-D.2.

E. 100 percent of the installed cabling links must pass the requirements of ANSI/TIA-568-D.2 and as further detailed in this Section.

F. Diagnose and correct any failing link.

1. Follow the corrective action with a new test to prove that the corrected link meets the performance requirements.
2. Provide the final and passing result of the tests for all links in the test results submission.

G. Use a permanent link interface adapter for the test device that can be calibrated to extend the reference plane of the Return Loss measurement to the permanent link interface.

3.6 OPTICAL FIBER CABLE TESTING

A. Record link and channel test results from the OLTS in the test device.

B. Test each cabling segment (connector to connector).

C. Test each cabling channel (equipment to equipment).

D. Use high-quality test cords of the same fiber type as the cabling under-test.

E. The test cords for OLTS testing must be between 1 m (~ 3 ft.) and 5 m (~ 15 ft.) in length.

F. Optical loss testing for backbone links:

1. Test multimode backbone links at 850 nm and 1300 nm in accordance with TIA-526-14-C, Method B, One Reference Jumper or the equivalent method.
2. Test single-mode backbone links at 1310 nm and 1550 nm in accordance with TIA-526-7-A, Method A.1, One Reference Jumper or the equivalent method.
3. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices (i.e., link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers).
4. Use the One Reference Jumper Method specified by TIA-526-14-C, Method B and TIA-526-7-A, Method A.1 or the equivalent method.
5. Follow the procedures established by these standards or application notes to conduct performance testing accurately.

G. OTDR testing:

1. Test fiber links at the appropriate operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss:

    a. Multimode: 850 nm and 1300 nm.
    b. Single-mode: 1310 nm and 1550 nm.

2. Test each fiber link and channel in both directions.
3. Install a launch cable between the OTDR and the first link connection.
4. Install a receive cable after the last link connection.

H. Magnified end-face inspection:

1. Inspect fibers at 250 times or 400 times magnification, as applicable:

    a. Use 250 times magnification for inspecting multimode and single-mode fibers.
    b. Use 400 times magnification for a detailed examination of single-mode fibers.

2. Diagnose and correct scratched, pitted or dirty connectors.
3. Record end-face images in the memory of the test device.

I. Length Measurement:

1. Electronically measure and record the length of each fiber using an OLTS.

J. Polarity Testing:

1. Test paired duplex fibers in multi-fiber cables to verify polarity in accordance with Clause E.5.3 of ANSI/TIA 568-D.2 using an OLTS.

3.7 SITE QUALITY-CONTROL

A. Site Tests and Inspections:

1. Make available for inspection the test results as soon as the tests are complete.
2. Consider all optical fiber cabling that returns a Fail test to have failed.
3. The pass or fail condition for the link-under-test is determined by the results of the required individual tests (detailed in Section 4.2.2 of ANSI/TIA-1152). Any fail or fail* result yields a failure for the link-under-test. To achieve an overall pass condition, the results for each test parameter must pass.
4. Consider any link-under-test that returns a pass* condition to have failed.

B. Verification

1. After testing the Commissioner will select a random sample of 5 percent of the installed links and witness the re-testing of those links.
2. The Commissioner will compare these results to the initial test results.
3. If more than 2 percent of the sample results differ in terms of the pass/fail determination, retest all links under the supervision of the Commissioner and bear all associated costs.

END OF SECTION 270800

SECTION 271116 – COMMUNICATIONS CABINETS RACKS FRAMES AND ENCLOSURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Equipment cabinets, racks, and telecommunications enclosure components utilized to house telecommunications infrastructure components within technology distribution spaces

1. Equipment Cabinets
2. 2-Post Equipment Racks

B. Related Requirements

1. Section 270526 “Grounding and Bonding for Communications Systems”
2. Section 270553 “Identification for Communications Systems”
3. Section 271123 “Communications Cable Management and Ladder Rack”
4. Section 271126 “Communications Rack Mounted Power Protection and Power Strips”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

1. Indicate the complete configuration of each unique cabinet and rack.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for installer.

B. Product Certificates.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each product

1. Manufacturer’s manual for the specific piece of equipment.

B. Warranty Documentation: For the system.

C. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Incorporated.
2. Chatsworth Products Inc.
3. Ortronics by Legrand North America LLC.
4. Panduit Corp.
5. Or approved equal.

2.2 2-POST 19 in. RACK

A. Regulatory Requirements

1. EIA-310-E Compliant.
2. UL Listed for Standard for Audio/Video, Information, and Communication Technology Equipment Cabinet, Enclosure and Rack Systems.
3. Trade Agreements Act (TAA) Compliant.

B. Performance Criteria

1. Dimensions: 2100 x 516.1 x 381 mm (84 x 20.3 x 15 in.) (height x width x depth) 45U
2. Provides front and rear support for 482.6 mm (19 in.) wide EIA rack-mount equipment and shelves.
3. Marks on the frame for vertical alignment.
4. 1 RU spacing, marked and numbered.
5. Numbering is to be sequential starting with one at the bottom of the cabinet.
6. EIA-310-E vertical hole spacing.
7. Load capacity.
8. 453.6 kg (~ 1000 lbs.) static load.
9. Welded steel and bolted aluminum two post frame.

C. Materials: Aluminum

D. Assembly: Field Assembly

E. Finish Material: Powder Coat Black

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

B. Evaluation and Assessment

1. Inspect the installation spaces for the equipment.
2. Measure each space to verify adequate clearances for the equipment, clearance for door swings (as applicable) and installation and removal of equipment.
3. Advise the Commissioner of any discrepancies between the construction documents and field conditions.
4. Unless otherwise noted, the minimum clearance in front and behind equipment cabinets and 4-post equipment racks is 914 mm (~ 36 in).

5. Unless otherwise noted, the minimum clearance in front and behind 2-post equipment racks is 1.22 mm (~ 4 ft).

3.3 PREPARATION

A. Surface Preparation

1. Clean telecommunication spaces before installing equipment.
2. Vacuum the space's surfaces.

3.4 INSTALLATION

A. Assemble and mount all racks and cabinets in accordance with the manufacturer's instructions.

B. Install as per:

1. The manufacturer's recommended installation instructions
2. BICSI ITSIMM
3. NECA-1
4. NFPA 70

C. Anchor cabinets in place.

D. Anchor 2-post and 4-post equipment racks securely to slab at the front and rear flanges.

E. Affix overhead ladder rack or cable tray to cabinets or racks where available.

F. Fasten wall-mount cabinets and wall-mount racks such that the weight of the unit and the full static load capacity are supported with a minimum factor of safety of 1.5.

G. Bond each equipment rack and cabinet with green insulated 6 AWG wire to nearest telecommunications grounding busbar. Use lug type connectors at each end.

H. Seismically brace in adherence with the construction regulations relative to the building's seismic zone.

3.5 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose.

H. Install dust sheets over installed cabinets.

END OF SECTION 271116

SECTION 271119 – COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Patch panels, wall, and rack-mounted blocks and associated components for the termination of telecommunications infrastructure cabling.

1. Twisted-pair Copper Patch Panels

B. Related Requirements:

1. Section 270553 “Identification for Communications Systems”
2. Section 270800 “Testing and Certification for Communications”
3. Section 271513 “Communications Copper Horizontal Cabling”
4. Section 271543 “Communications Faceplates and Connector

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

C. Samples: Submit a sample for each component.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for installer.

B. Product Certificates.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: For each product.

B. Operation and Maintenance Data: For each product.

1. Manufacturer’s manual.

C. Warranty Documentation: For the system.

D. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste is part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

1.9 WARRANTY

A. Provide a manufacturer’s 25-year warranty on the structured cabling system.

B. All products within this section are to be from a single manufacturer and must be compatible with products specified in the following sections in order to provide the manufacturer’s warranty:

1. Section 271513 “Communications Copper Horizontal Cabling”.
2. Section 271543 “Communications Faceplates and Connectors”.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Incorporated.
2. CommScope Inc.
3. Corning Cable Systems.
4. Cleerline Technology Group.
5. Ortronics by Legrand North America, LLC.
6. Panduit Corp.
7. Or approved equal.

B. All products within this section are to be from a single manufacturer and must be compatible with products specified in the following sections:

1. Section 271513 “Communications Copper Horizontal Cabling”
2. Section 271543 “Communications Faceplates and Connector

2.2 TWISTED-PAIR PATCH PANELS

A. Regulatory Requirements

1. UL Listed
2. Trade Agreements Act (TAA) Compliant

B. Performance/Design Criteria

1. Angled patch panel.
2. Flat patch panel.
3. Rack-mountable panels with front-facing female 8P8C (RJ45-type) connectors and rear-facing insulation displacement contact connectors. Each connector and the panel overall must meet or exceed all requirements for the designated Category rating as described in TIA-568-C-2.
4. Twenty-four (24) connectors for each one (1) U.
5. Forty-eight (48) connectors for each one (1) U.
6. Sufficient finger space must be allowed for connectors to be easily mounted and demounted.
7. Allow an operator to terminate and handle individual cables without disturbing other terminated cables.
8. Mounting: EIA 483 mm (~19 in) mounting hole pattern.
9. Strain relief: Bars on the rear of all panels or other integrated method. Terminated cable bend radius may not exceed 50 mm (~ 2 in.).
10. Labeling: Designation strips and holders for the front and back for each jack or group of jacks.
11. TIA wiring scheme: T568A.
12. Color: Black.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 PREPARATION

A. Review the cabling plans and verify the patch panel and termination block quantities based on the number of terminating cables.

B. Create cable termination schedules and labeling methodology and coordinate with the Commissioner before cable installation.

3.4 INSTALLATION

A. Install as per:

1. The manufacturer’s recommended installation instructions
2. ANSI/TIA-568-D.0
3. ANSI/NECA/BICSI 568-2006
4. BICSI ITSIMM
5. NECA-1

B. Mount patch panels and splice housings in the cabinet or rack.

C. Attach all strain relief bars, coupler panels, connectors, splice trays, and other accessories.

D. Utilize all strain relief devices, termination caps and other devices provided with the assemblies, per the manufacturer’s instructions.

E. Dress cables according to best practices, in a neat, workmanlike manner, as would customarily be performed by other contractors in the community.

F. Leave slack as appropriate.

G. Terminate cabling to the patch panels according to the coordinated cable termination schedules.

H. For modular jack patch panels, terminate individual jacks and attach to the respective panel.

I. For bulkhead couplers, terminate cables with the appropriate connector and attach to the couplers.

J. Bond cable shields and attach patch panel ground lugs to the respective rack grounding busbar, as applicable.

K. Interface with Other Work

1. 271513 “Communications Copper Horizontal Cabling”

3.5 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose.

END OF SECTION 271119

SECTION 271123 – COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes:

1. Vertical cable management
2. Horizontal cable management
3. Ladder rack

B. Related Requirements:

1. Section 271116 "Communications Cabinets, Racks, Frames, and Enclosures"

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for installer.

B. Product Certificates:

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each product.

1. Manufacturer’s manual.

B. Warranty Documentation: For the system.

C. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Incorporated.
2. Chatsworth Products Inc.
3. Ortronics by Legrand North America, LLC.
4. Panduit Corp.
5. Or approved equal.

2.2 VERTICAL CABLE MANAGEMENT

A. Regulatory Requirements:

1. UL Listed
2. TAA Compliant

B. Performance Criteria:

1. Dimensions: ~ 2.1 m x ~ 150 mm x ~ 410 mm (7 ft x 6 in x 16.15 in.) (height x width x depth).
2. Double-sided management.
3. Door/cover with handle, dual-hinged, removable, full length, front and back.

C. Materials: Aluminum and Plastic.

D. Assembly: Factory Assembly.

E. Finish Material: Black.

F. Provide any accessory products related to the wire management components to provide a complete and functional infrastructure system.

2.3 HORIZONTAL CABLE MANAGEMENT

A. Regulatory Requirements

1. UL Listed
2. TAA Compliant

B. Materials: Aluminum.

C. Assembly: Factory Assembly.

D. Finish Material: Black.

E. Provide any accessory products related to the wire management components to provide a complete and functional infrastructure system.

2.4 LADDER RACK

A. Regulatory Requirements

1. UL Listed
2. TAA Compliant

B. Performance Criteria:

1. All industry standard cable runway is to be manufactured with tubular steel in widths indicated in the project drawings and is to be configured with industry standard ~ 38.1 mm (1.5 in) ladder cross bars positioned ~ 230 mm (9 in) on center perpendicular to the rails.
2. Cable runway system is to include Listed and approved components to provide and install the necessary seismic zone support system including end caps, wall angle support brackets, bonding straps, butt-splice kits, junction splice kits, and top rack-to-runway mounting kits.
3. The cable runway system shall include a corner section at each intersection that creates a radius “L”, “X”, and/or “T” formed when two (2) or more pieces of cable runway are connected with a junction splice assembly.

C. Materials: Aluminum and Plastic.

D. Assembly: Factory Assembly Components. Field Assembly System.

E. Finish Material: Black.

F. Accessory Products:

1. Provide any accessory products related to the cable runways system to provide a complete and functional infrastructure system. The cable runway accessories include, but are not limited to:
2. Cable runway bend radius drop assemblies (sized per runway section).
3. Cable runway movable cross member assemblies to support cable runway bend radius drop assemblies (sized per runway section).
4. Runway butt-splice, swivel splice and foot kits.
5. Cable runway corner brackets (sized per runway and site conditions).
6. Rack-to-runway mounting plates (sized per runway section).
7. Cable runway elevation kits (sized per site conditions).
8. Wall angle support brackets (sized per runway section).
9. Threaded rod assemblies for overhead attachment.
10. Slotted Support brackets for runway attachment to threaded rod assemblies.
11. Vertical wall-mounting brackets.
12. Runway grounding kits.
13. Protective end caps.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 INSTALLATION

A. Vertical and Horizontal Cable Management:

1. Install as per:

a. the manufacturer’s recommended installation instructions.
b. ANSI/NECA/BICSI 568-2006.

c. BICSI ITSIMM.
d. NECA-1.

2. Secure all cable bundles with hook and loop fastener cable wraps; plastic wire ties are not acceptable.
3. Do not pull hook and loop fastener cable wraps tight enough to kink the cable jacket.

B. Cable Runway System:

1. Install as per:

a. The manufacturer's recommended installation instructions.
b. ANSI/NECA/BICSI 568-2006.
c. BICSI ITSIMM.
d. NECA-1.

2. Provide vertical support to the slab above if a cable runway section spans a distance greater than ~ 1.2 m (4 ft).

3.4 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose.

END OF SECTION 271123

SECTION 271126 – Communications Rack Mounted Power Protection and Power Strips

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes: Power strips in cabinets, racks and frames within telecommunication spaces

1. Power Distribution Unit.

B. Related Requirements:

1. Section 271116 “Communications Cabinets, Racks, Frames, and Enclosures”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for installer.

B. Product Certificates:

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: For each product.

B. Operation and Maintenance Data: For each product.

C. Manufacturer’s manual.

D. Warranty Documentation: For the system.

E. Record Documentation: Record drawings indicating the location of all the components and component identification.

F. Software

1. Licenses.
2. Subscriptions.
3. Software and Firmware Operational Documentation.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

C. Ambient Conditions

1. Do not install the equipment in an environment that is not temperature-regulated as per the manufacturer’s instructions.
2. Do not install the equipment in an environment that is dirtier than one would ordinarily expect for the room function.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. APC by Schneider Electric
2. Tripp Lite

3. Vertiv Co.
4. Or approved equal.

2.2 RACK AND CABINET MOUNTED VERTICAL POWER STRIPS

A. Regulatory Requirements.

1. UL Listed for Information Technology Equipment – Safety – Part 1 (UL 60950-1).
2. TAA Compliant.

B. Performance/Design Criteria

1. Output

a. Nominal Output Voltage: 200V,208V
b. Overload Protection: Yes
c. Maximum Total Current Draw: 30
d. Output Connections:
e. Three (3) IEC 320 C19
f. Twenty-one (21) IEC 320 C13

2. Input

a. Nominal Input Voltage: 200V,208V,230V
b. Input Frequency: 50-60 Hz
c. Input Connection: NEMA L6-30P
d. Core Length: ~3 m (10 ft.)
e. Load Capacity: 5000VA
f. Maximum Input Current: 30A
g. Maximum Line Current: 30A

3. Physical

a. Dimensions: 1.829 m x 56 mm x 46 mm (~72 ft x ~2.2 in x ~1.82 in) zero U
b. Weight: 7.64 kg (~ 16.8 lbs.)

4. Environmental

a. Operating Temperature: -5 - 45°C (41 - 113°F)
b. Operating Relative Humidity: 5 - 95 percent
c. Operating Elevation: 0 - 3000 m (0 - ~ 10000 ft.)

5. Communications

a. Serial
b. USB
c. 10/100 Base-T
d. Environmental sensor port

C. Assembly

1. Factory Assembly.

D. Finishes

E. Finish Materials: Black

F. Accessories

1. Mounting brackets
2. Environmental sensor

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 PREPARATION

A. Surface Preparation

1. Clean telecommunication spaces before installing equipment.
2. Vacuum the space surfaces.
3. Apply a microfiber cloth to all surfaces working from the top surfaces to the bottom from the farthest position in the room to the exit of the room.
4. Install sticky dust mat at the immediate entrance to the room.

3.4 INSTALLATION

A. Uninterruptible Power Supplies

1. Install unit as per the Manufacturer’s recommendations.
2. Verify the network monitoring capabilities of the unit, record the results.
3. Verify the function of the unit, record the results.

B. Rack and Cabinet Vertical Power Strips

1. Install unit as per the Manufacturer's recommendations.
2. Verify the network monitoring capabilities of the units, record the results.
3. Verify the function of the unit, record the results.

3.5 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Site Tests and Inspections

1. Prove the network monitoring capabilities of the units.
2. Prove the function of the installed units.

C. Remove non-compliant or otherwise damaged components.

D. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

E. Coordinate any reinstallation work, in writing, with the Commissioner.

F. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

G. Waste Management: Recycle all detritus.

H. Protect the system from subsequent construction operations and use contrary to its primary purpose.

END OF SECTION 271126

SECTION 271513 – COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Four-pair unshielded twisted-pair copper horizontal workstation cabling to distribute network signals from telecommunications distribution spaces to workstation outlet locations.

1. Category 6A horizontal cabling.

B. Related Requirements:

1. Section 270553 “Identification for Communication Systems”
2. Section 270800 “Testing and Certification for Communications”
3. Section 271119 “Communications Termination Blocks and Patch Panels”
4. Section 271543 “Communications Faceplates and Connectors”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

C. Samples: Submit a sample for each component.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Installer qualifications.
2. Installer’s manufacturer’s Certifications.

B. Product Certificates.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each product.

B. Manufacturer’s manual.

C. Warranty Documentation: For the system.

D. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. The installer is to have all certifications required by the cable manufacturer to provide a 25-year manufacturer’s warranty.

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

1.9 MANUFACTURER WARRANTY

A. Provide Manufacturer Warranty.

B. Warranty Period: 25 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Incorporated.
2. CommScope Inc.
3. Leviton Manufacturing Co., Inc.
4. Ortronics by Legrand North America, LLC.
5. Panduit Corp.
6. Or approved equal.

B. All products within this section are to be from a single manufacturer and must be compatible with products specified in the following sections in order to provide a 25-year manufacturer's warranty.

1. Section 271119 "Communications Termination Blocks and Patch Panels"
2. Section 271543 "Communications Faceplates and Connector

2.2 FOUR-PAIR UTP CABLING

A. Regulatory Requirements

1. UL Listed
2. TAA Compliant

B. Performance/Design Criteria

1. ANSI/TIA-568.2-D Category 6A copper UTP, twenty-four (24) AWG cable plenum rated cable.
2. ANSI/TIA-568.2-D Category 6A copper UTP, twenty-four (24) AWG cable riser rated cable.
3. Use riser rated cable where allowed by NFPA 70.

C. Finish Materials: Sheath color: White

D. Provide any accessory products related to the UTP copper cabling required to provide a complete and functional infrastructure system.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 INSTALLATION

A. Install as per:

1. The manufacturer’s recommended installation instructions.
2. ANSI/TIA-568-D.0
3. ANSI/NECA/BICSI 568-2006
4. BICSI ITSIMM
5. NECA-1

B. Install all cables with proper attention paid to bend radius, pulling method, attachment method, and pulling forces as per ITSIMM.

C. Follow the cable manufacturer's specifications for each particular cable type.

D. Visually inspect for sufficient bend radius during and after pulling.

E. Support cabling at least every 1.5 mm (~ 5 ft.).

F. Label cables at both ends 300 mm (~ 1 ft.) from each cable end.

G. Label cables contained in conduit at every pull box.

H. Install appropriate sheath construction for the environment.

I. Meet all TIA and industry standards with special regards to maximum stripping length of cable jackets. Do not remove more than 10 mm (.378 in.) of cable jacket from the termination points.

J. Tolerances

1. Coordinate outlet positions on site and assume that outlets may move 3 m (~ 10 ft.) from their drawn position.

K. Terminate cabling in conjunction with the following sections:

1. Section 271119 “Communications Termination Blocks and Patch Panels”
2. Section 271543 “Communications Faceplates and Connectors”

L. When cabling is terminated as per the previous paragraph, test and certify cabling as per Section 270800 “Testing and Certification for Communications”.

3.4 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose.

END OF SECTION 271513

SECTION 271543 – COMMUNICATIONS FACEPLATES AND CONNECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes horizontal workstation cable termination components and outlet housing components. Includes wall-mount, floor-mount, and ceiling-mount components to support the various workstation outlets throughout the cabling plant.

B. Related Requirements:

1. Section 270553 “Identification for Communication Systems”
2. Section 270800 “Testing and Certification for Communications”
3. Section 271119 “Communications Termination Blocks and Patch Panels”
4. Section 271513 “Communications Copper Horizontal Cabling”

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.

C. Samples: Submit a sample for each component.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: for installer.

B. Product Certificates: for all products.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: For each product

1. Manufacturer’s manual

B. Operation and Maintenance Data: For each product.

C. Warranty Documentation: For the system.

D. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Install and coordinate all work with all interrelated trades.

B. Delivery and Acceptance Requirements:

1. Deliver in manufacturer’s original unopened and undamaged packages with manufacturer’s labels legible and intact.
2. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
3. Inspect manufacturer’s packages upon receipt.
4. Storage and Handling Requirements: Protect from moisture, falls and compaction.
5. Packaging Waste Management: Recycle all materials.

1.9 WARRANTY

A. Provide a manufacturer’s 25-year warranty on the structured cabling system.

B. All products within this section are to be from a single manufacturer and must be compatible with products specified in the following sections in order to provide the manufacturer’s warranty:

1. Section 271119 “Communications Termination Blocks and Patch Panels”
2. Section 271543 “Communications Faceplates and Connectors”.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden Incorporated.
2. CommScope Inc.
3. Leviton Manufacturing Co., Inc.
4. Ortronics by Legrand North America, LLC.
5. Panduit Corp.
6. Or approved equal.

B. All products within this section are to be from a single manufacturer and must be compatible with products specified in the following sections:

1. Section 271119 “Communications Termination Blocks and Patch Panels”
2. Section 271513 “Communications Copper Horizontal Cabling”

2.2 COPPER OUTLETS

A. Regulatory Requirements

1. UL Listed
2. TAA Compliant

B. Performance/Design Criteria

1. ANSI/TIA-568.2-D Category 6A copper UTP patch cord.
2. All UTP connectors are to have an eight (8) position, eight (8)-conductor module that accepts both RJ-45 and RJ-11 modular plugs.
3. Performance of the outlet connector will decrease with an RJ-11 modular plug at any time.
4. When utilized as part of a channel or permanent link, all high-performance modular outlet connectors must not decrease the horizontal cable elevated performance transmission requirements before and after installation as specified in TIA-568.1-D.
5. Front-of-house outlets are to utilize a three-part assembly, jack to a 106-type frame, 106-type frame to vanity faceplate cover.
6. ANSI/TIA-606 compliant.

C. Finishes

1. Faceplates must match the electrical faceplates.
2. Finish Materials:

a. Jack: White / Black / Red / Orange / Yellow / Green / Blue.
b. Blank inserts: To match the jack color.
c. Front-of-house: 106-type frame: White / Black / Ivory.

d. Back-of-house: White.
e. Back-of-house (plant areas): stainless steel.

D. Accessories

1. Spiral wrap tubing

a. Color: Black.
b. Product Material: Polyethene.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.3 INSTALLATION

A. Install as per:

1. The Manufacturer’s recommended installation instructions.
2. ANSI/NECA/BICSI 568-2006.
3. BICSI ITSIMM.
4. NECA-1.
5. NFPA 70.
6. TIA-568.2-D.
7. Follow commonly accepted industry practices when they are not in conflict with the above requirements.

B. Install all outlet housings, including faceplates, level and plumb.

C. Mount wall outlets at right angles and parallel to the floor.

D. Protect exposed cabling with spiral wrap tubing.

E. Install blank inserts in outlet housing spaces that do not have ports.

F. Label outlets and ports.

3.4 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged components.

C. No additional burden to the City Of New York regarding costs, network downtime, or end-user interruption will result from the reinstallation of specified components.

D. Coordinate any reinstallation work, in writing, with the Commissioner.

E. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

F. Waste Management: Recycle all detritus.

G. Protect the system from subsequent construction operations and use contrary to its primary purpose.

END OF SECTION 271543

SECTION 272133 – DATA COMMUNICATIONS WIRELESS ACCESS POINTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wireless Access Points – Install only, no requirement to configure.
2. Wireless Access Point enclosures.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: For each product.

B. Operation and Maintenance Data: For each product.

C. Record Documentation:

1. Record drawings indicating the location of all the components and component identification.
2. Schedule detailing which access points are connected to which data outlets and ports.

D. Keys for each enclosure, marked with printed labels detailing which enclosure they open.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 COORDINATION

A. Liaise with the Commissioner three (3) weeks before the IT equipment installation date.

B. Commissioner will send IT equipment to site within three (3) weeks of the installation date.

C. Accept responsibility for IT equipment upon receipt until substantial completion as for any other item directly procured.

D. Notify the Commissioner:

1. Where the document references sections that are unavailable.
2. Where conflicts arise from requests in the documentation, implement the most onerous provision.

PART 2 - PRODUCTS

2.1 WIRELESS ACCESS POINT ENCLOSURES

A. Products: Subject to compliance with requirements, provide the following:

1. Locking Suspended Ceiling Tile Wi-Fi Access Point Enclosure with 12.5 x 12.5 x 3in. Back Box for City of New York-Furnished WAP.
2. Recessed Wall and Hard-Lid Ceiling New Construction Installation Kit for City of New York-Furnished WAP.
3. Wi-Fi Access Point Lock Box with Opaque Door for City of New York-Furnished WAP.

B. Regulatory Requirements

1. UL 2416.

C. Assembly.

1. Factory Assembly

D. Finish Materials: As Factory.

E. Accessories

1. Firestop kit.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions

1. Check actual site conditions before starting any Work.
2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section .

3.3 PREPARATION

A. Verify installation of structured cabling and connection to the network switch.

B. Liaise with the Commissioner so that they are ready to configure the IT Equipment remotely.

3.4 INSTALLATION

A. Wireless Access Point Enclosures

1. Description – Physical installation.

a. Install as per the Manufacturer's recommendations.
b. Install switches in the rack in the positions as shown on the Contract Drawings.

1) Secure using all screw holes.

c. Attach power lead into the device and plug into the A power distribution unit.
d. Attach power lead into the device and plug into the B power distribution unit.
e. Connect the LAN interfaces.
f. Connect out-of-band interfaces.
g. Confirm with Commissioner that they can access the IT Equipment remotely.

B. Wireless Access Points

1. Description – Physical installation.

a. Install as per the manufacturer's recommendations.
b. Affix APs in the manner Manufacturer describes.
c. Affix APs in the manner the Wireless Access Point Enclosure Manufacturer describes.
d. Connect the AP to the structured cabling system with patch cords.
e. Verify that the AP is receiving power.
f. Record the outlet and ports to which the AP is connected.
g. Confirm with Commissioner that they can access the IT Equipment remotely.

3.5 ADJUSTING AND CLEANING

A. Adjust for proper operation.

B. Remove non-compliant or otherwise damaged.

C. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.

D. Waste Management: Recycle all detritus.

E. Protect equipment from physical intrusion.

F. Protect the system from subsequent construction operations and use contrary to its primary purpose.

G. Do not connect equipment directly to any public facing internet connection except where the equipment is expressly for that purpose.

END OF SECTION 272133

SECTION 274116 – INTEGRATED AUDIOVISUAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.3 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.4 SYSTEM DESCRIPTION

A. It is the intent of these specifications to provide a complete working audio visual system ready for the City of New York's use. System acceptance will be judged on the successful adherence to the installation instructions of this Specification.

B. Any item not specifically shown on the drawings or called for in the specifications, but normally required to conform to the intent, are to be considered as part of the Work.

C. Any given item type of equipment or material will be the product of one manufacturer throughout the facility. Multiple manufacturers of any one item will not be permitted, unless specifically noted otherwise.

D. These specifications are equipment and performance specifications and are considered to be one all-encompassing package with the drawings. Actual installation will be as engineered by the Contractor with prior approval by the Commissioner.

E. Provide audio visual devices and equipment with performance levels and capacities as noted herein.

1.5 SCOPE OF WORK

A. General: Provide audio visual systems design, engineering, and installation within all phases and spaces of the Project. Systems are to include all devices, equipment, installation, programming and commissioning in accordance with requirements of the contract documents and drawings.

B. The Work detailed within the Contract Documents has been specified to meet certain requirements for performance, appearance, and costs. It will be the responsibility of the Contractor to implement the guidelines and requirements contained in the Contract Documents and translate them into a complete design package containing all elements necessary for a complete, operational, and functionally integrated Audio Visual System.

1.6 MANUFACTURER WARRANTY

A. Provide Manufacturer Warranty.

B. Warranty Period: 3 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Multipurpose Room (C01)

1. The AV system within the Multipurpose Room (C01) will support local presentations and guests. The Multipurpose Room (C01) is a multi-use space which hosts a wide variety of events. This room will use a ceiling-mounted projector and projection screen. A gooseneck mic will be attached to the lectern. Laptop connectivity will be located at the AV wall plate and will include an HDMI input for presentations, mic inputs, and audio outputs. A wireless mic system with a handheld mic and a lavalier mic will also be included. Ceiling speakers will be used for the playback of program audio. An assistive listening system with an induction loop installed at the floor will amplify the audio for those wearing T-Coil hearing aids or the system's earpieces. Control of the AV system will be from a wall mounted touch panel.

B. Teen Reading Room (C05)

1. The AV system within the Teen Reading Room will be for general viewing/digital signage. One (1) display will be for Programming/Marketing and one (1) display will be for the Online Public Access Computer (OPAC) station queue. The Service Desk will also have a localized ADA Induction Loop system.

C. Quiet Room (C06)

1. The Quiet Room will support Bring Your Own Device (BYOD) conferencing. This room will use a wall mounted 75" flat panel display. There will be a USB camera with an integrated microphone for video/ audio conferencing via a dedicated OFE PC located at the AV rack. When a laptop is connected to the USB cables at the conference table, the laptop can use the camera for video/ audio conferencing. Presentations on the flat panel display will be possible from either the dedicated OFE PC or laptop via the HDMI extender at the table. Display mounted soundbars will be used for the playback of program audio. An assistive listening system with an induction loop installed at the floor will amplify the audio for those wearing T-Coil hearing aids or the system's earpieces. Control of the AV system will be from a wall mounted touch panel.

D. Adult Reading Room (103) & Checkout (104)

1. The AV system within the Adult Reading Room and Checkout will be for general viewing/digital signage. One (1) display will be for for Programming/Marketing and one (1) display will be for the Online Public Access Computer (OPAC) station queue. The Service Desk will also have a localized ADA Induction Loop system.

E. Multipurpose Room (206)

1. The Multipurpose Room (206) is a multi-use space which hosts a wide variety of events. This room will use a wall mounted 85" flat panel display. A gooseneck mic will be attached to the lectern. Laptop connectivity will be located at the AV wall plate and will include an HDMI input for presentations, mic inputs, and audio outputs. A wireless mic system with a handheld mic and a lavalier mic will also be included. Display mounted soundbars will be used for the playback of program audio. An assistive listening system with an induction loop installed at the floor will amplify the audio for those wearing T-Coil hearing aids or the system's earpieces. Control of the AV system will be from a wall mounted touch panel.

F. Children's Reading Room (201)

1. The AV system within the Children's Reading Room will be for general viewing/digital signage. One (1) display will be for for Programming/Marketing and one (1) display will be for the Online Public Access Computer (OPAC) station queue. The Service Desk will also have a localized ADA Induction Loop system.

G. Paging System

1. The Paging System will allow for audio announcements to be heard via speakers. This system will be independent from the AV systems specified in the other spaces. The Paging system will require a connection to the client LAN to allow for setup and general management of the system. The system will connect to the client's VOIP phone system to perform zoned or all paging via phone extensions.

H. Instruction / Support Materials

1. Contractor to provide comprehensive single page quick start guides that are printed and laminated.

2.2 COMPONENTS – VIDEO PROJECTOR

A. Performance/Design Criteria

1. Light Output minimum 9000 lumens, laser light source.
2. Native Resolution WUXGA 1920x1200, Max Resolution 4K 4096x2160.
3. Lens Shift: Vertical +/-60%, Horizontal +/-18%.
4. Lenses are interchangeable.
5. AV connections are located at the side and not the rear of the projector.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sharp-NEC
2. Digital Projection
3. Panasonic

4. Or approved equal.

2.3 COMPONENTS – PROJECTION SCREEN

A. Performance/Design Criteria

1. Image size: 123” diagonal, 104” wide by 65” high
2. Door motor electrically operated 120 volt (60 Hz) not more than 1.2 amp.
3. Screen motor is electrically operated 120 volt (60 Hz) not more than 2.4 amp.
4. Screen fabric to be seamless and mildew resistant with black masking borders standard.
5. Controls to include integrated low voltage control unit and three position control switch and cover plate.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Da-Lite
2. Draper
3. Stewart Filmscreen
4. Or approved equal.

2.4 COMPONENTS – AV RECEIVER WITH SCALER

A. Performance/Design Criteria

1. Extends audio, video, and control signals to at least 300 feet.
2. Video Input & Output: support for up to 4K resolutions (3840x2160 and 4096x2160)
3. Frame Rate up to 60Hz.
4. Chroma Sampling up to 4:4:4
5. Copy Protection at least HDCP 2.2.
6. Support for EDID management.
7. Support for Stereo audio.
8. RJ45 input, HDMI output.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crestron
2. Extron
3. Kramer
4. Or approved equal.

2.5 COMPONENTS – AV TRANSMITTER WALLPLATE

A. Performance/Design Criteria

1. Extends audio, video, and control signals to at least 300 feet.
2. Decora mounting style to fit in a 1-gang junction box
3. Video Input & Output: support for up to 4K resolutions (3840x2160 and 4096x2160)
4. Frame Rate up to 60Hz.

5. Chroma Sampling up to 4:4:4
6. Copy Protection at least HDCP 2.2.
7. Support for EDID management.
8. Support for Stereo audio.
9. HDMI input, RJ45 output.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crestron
2. Extron
3. Kramer
4. Or approved equal.

2.6 COMPONENTS – AV TRANSMITTER

A. Performance/Design Criteria

1. Extends audio, video, and control signals to at least 300 feet.
2. Video Input & Output: support for up to 4K resolutions (3840x2160 and 4096x2160)
3. Frame Rate up to 60Hz.
4. Chroma Sampling up to 4:4:4
5. Copy Protection at least HDCP 2.2.
6. Support for EDID management.
7. Support for Stereo audio.
8. HDMI input, RJ45 output.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crestron
2. Extron
3. Kramer
4. Or approved equal.

2.7 COMPONENTS – AUDIO AMPLIFIER

A. Performance/Design Criteria

1. Minimum output of 2 audio channels for both low and high impedance (70V) or two bridged high impedance channels.
2. Output power minimum 100 watts per channel.
3. Frequency response of 20 Hz to 20 kHz
4. Amplifier Type Class D.
5. Rotary gain or attenuation control.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crestron
2. Extron
3. QSC

4. Or approved equal.

2.8 COMPONENTS – AUDIO INPUT WALLPLATE XLR

A. Performance/Design Criteria

1. Must have 2 XLR passthrough input connectors.
2. Decora mounting style to fit in a 1-gang junction box.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Radio Design Labs
2. Extron
3. AtlasIED
4. Or approved equal.

2.9 COMPONENTS – AUDIO OUTPUT WALLPLATE XLR

A. Performance/Design Criteria

1. Must have 2 XLR passthrough output connectors.
2. Decora mounting style to fit in a 1-gang junction box.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Radio Design Labs
2. Extron
3. AtlasIED
4. Or approved equal.

2.10 COMPONENTS – GOOSENECK MICROPHONE

A. Performance/Design Criteria

1. XLR output connector
2. Will be mountable to the desk top surface.
3. Will mount into a compatible shock mount either included or purchased separately
4. Length to be minimum 12 inches.
5. Cardioid polar pattern.
6. Frequency Response within 40 Hz to 18 kHz
7. Impedance minimum 100 ohms
8. Max SPL at least 120 dB
9. Supports phantom power

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Shure
2. Audix

3. Sennheiser
4. Or approved equal.

2.11 COMPONENTS –CEILING SPEAKERS

A. Performance/Design Criteria

1. Minimum 6.5” woofer, 0.75” tweeter
2. Must recess mount into either ceiling tile or drywall / non-removable ceiling surfaces.
3. Transformer Taps within 7.5W to 65W at 70V.
4. Minimum frequency range of 55Hz to 20 KHz (-10 dB)
5. Sensitivity of 88 dB @ 1W/ 1m
6. Minimum coverage of 95 degrees
7. Grille is paintable, and magnetically held
8. Minimum 10.5” diameter x 3.95” depth.
9. Plenum rated enclosure

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crestron
2. Extron
3. QSC
4. Or approved equal.

2.12 COMPONENTS –WIRELESS MICROPHONE SYSTEM

A. Performance/Design Criteria

1. System to include 1 receiver, 1 handheld mic, 1 bodypack, 1 lavalier mic, associated cables and hardware.
2. Receiver has one audio channel output with two included detachable antennas
3. 24 bit digital audio
4. Frequency range of 20 Hz to 20 kHz
5. RF Carrier Frequency Range 470 – 937.5 MHz depending on model
6. 120 db dynamic range
7. At least 60 channels per frequency band
8. Automatic channel scan
9. AES-256 encryption for secure wireless transmission
10. Transmitters will accept replaceable batteries

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Shure
2. Sennheiser
3. QSC
4. Or approved equal.

2.13 COMPONENTS –ASSISTIVE LISTENING INDUCTION LOOP SYSTEMS

A. Performance/Design Criteria

1. Loop Driver for Multipurporse rooms with dual loop outputs, 7.0A RMS (9.87 A pk) Max output, 20 V RMS (28.2 V pk) Max Output.
2. Loop Driver for Quiet Room with single loop output, 5.0A RMS (7.05 A pk) Max Output, 20 V RMS (28.2 V pk) Max Output.
3. 3.0mm2 Flat Copper Tape, for installation under floor coverings
4. Speaker cable AWG 14.
5. Countertop system to include Loop Driver, desktop mic, and loop cable.
6. Loop Design to be provided by loop manufacturer.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Williams AV
2. Ampetronic
3. Listen Technologies
4. Or approved equal.

2.14 COMPONENTS –AV PRESENTATION SWITCHER

A. Performance/Design Criteria

1. All-in-one video switcher, audio switcher/ mixer/ amplifier, and control processor.
2. Video inputs: 6 HDMI, 2 RJ45
3. Video Outputs: 2 HDMI, 2 RJ45
4. Video resolutions supporting up to 4K 4096 x 2160, 60 Hz, 4:4:4 Chroma Sampling, and at least 8 but color depth.
5. Audio Inputs: minimum 5 stereo, 4 Mic/ Line
6. Audio Outputs: minimum 3 stereo
7. Control Signals: minimum 1 RS232, 1 IR, 1 RJ45 to connect back to AV system.
8. Rack mountable.
9. Additional power supplies for RJ45 AV inputs and outputs , to be purchased separately as required.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crestron
2. Extron
3. Kramer
4. Or approved equal.

2.15 COMPONENTS –IN-WALL TOUCHPANEL

A. Performance/Design Criteria

1. Wall mounted touch panel with 10” diagonal color screen.
2. Resolution: Minimum 1280 x 800
3. Brightness: Minimum 400nits with LED light

4. 1 RJ45 connector for POE and network connection
5. Capacitive touch screen
6. Overall size: Minimum 9.4”W x 5.8”H x 2”D.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crestron
2. Extron
3. Kramer
4. Or approved equal.

2.16 COMPONENTS –POE NETWORK SWITCH

A. Performance/Design Criteria

1. Managed network switch with minimum of 4 RJ45 ports
2. Support for POE or better on each RJ45 port.
3. Rack mountable.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Netgear
2. Cisco
3. Pakedge
4. Or approved equal.

2.17 COMPONENTS –FLAT PANEL DISPLAYS

A. Performance/Design Criteria

1. Refer to drawings for locations, sizes, and quantities
2. Resolution up to 4K 3840 x 2160
3. Brightness minimum 500 nit
4. Rated for 24 hours, 7 days per week operation time.
5. RS232 and IR control
6. Minimum 1 HDMI 2.0 input.
7. Overall depth must be 3.5” or less.
8. Landscape orientation

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Samsung
2. Sharp / NEC
3. Panasonic
4. Or approved equal.

2.18 COMPONENTS –DISPLAY WALL MOUNT ARTICULATING

A. Performance/Design Criteria

1. Articulating wall mount to support TV weights up to 125 lbs.
2. Mounting Pattern Compatibility: 100x100mm x 800 x 400mm
3. Must support TVs in landscape orientation
4. Must be able to support in-wall installation with separate backbox.
5. Mount must not allow the display to protrude more than 4” from the wall to the front of the display.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chief
2. Peerless Mounts
3. RP Visual
4. Or approved equal.

2.19 COMPONENTS –DISPLAY BACKBOX FOR ARTICULATING MOUNT

A. Performance/Design Criteria

1. Allow for recessed in-wall installation of articulating wall mount.
2. Backbox must be compatible with and same brand as the articulating wall mount.
3. Must have knock-outs for cable pass through and the installation of junction boxes

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chief
2. Peerless Mounts
3. RP Visual
4. Or approved equal.

2.20 COMPONENTS –WEB CAMERA

A. Performance/Design Criteria

1. Resolution: 4K
2. Field of View up to 120 degrees.
3. Minimum 3X zoom
4. Auto white balance, exposure, sharpness, focus.
5. Minimum USB 2.0 connection for communication and power
6. Built-in microphone.
7. Built-in TV mount

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Clearone
2. Aver
3. Logitech

4. Or approved equal.

2.21 COMPONENTS –DISPLAY FLANKING SPEAKERS

A. Performance/Design Criteria

1. 1 pair of speakers mounted in portrait orientation, each on either side of the display.
2. Height to match the height of the display.
3. Impedance minimum 6 ohms
4. Recommended power 25-125 watts.
5. Max output 98dB avg, 104dB peak
6. Coverage: Vertical 110 degrees, Horizontal 140 degrees
7. Frequency Response within 20Hz – 20 kHz

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Leon Speakers
2. Innovox
3. JBL
4. Or approved equal.

2.22 COMPONENTS –SPEAKER BAR

A. Performance/Design Criteria

1. Wall mountable speaker
2. Accepts variable or fixed source volume from a display.
3. IR control
4. Built-in power amplifier
5. Internal power supply
6. Max Peak SPL 94 dB-SPL both channels driven
7. Frequency Response within 20Hz – 20 kHz
8. Total depth maximum 4”.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. JBL
2. Sonos
3. Yamaha
4. Or approved equal.

2.23 COMPONENTS –DIGITAL SIGNAGE PLAYER

A. Performance/Design Criteria

1. Resolution up to 4K video
2. Support for, but not limited to, H.265/ H.264 containers (.ts, .mov, .mp4, .mkv), HTML5, IP Streaming

3. Output HDMI 2.0a or better
4. RJ45 for network connection
5. Software for device management and configuration

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brightsign
2. VITEC
3. Kramer
4. Or approved equal.

2.24 COMPONENTS –USB SWITCHER

A. Performance/Design Criteria

1. Support for up to 2 host computers.
2. USB 2.0 or better,
3. Minimum 3 port USB hub
4. RS232 control

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Extron
2. Inogeni
3. StarTech
4. Or approved equal.

2.25 COMPONENTS –AV RACK IN-CABINET

A. Performance/Design Criteria

1. Metal open frame rack that pulls out and rotates 90 degrees
2. EIA Compliant
3. Closed depth maximum 20 inches.
4. Weight Capacity minimum 125 lbs
5. Mount rack to concrete base as required.
6. See drawings for size, quantity, and locations

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Middle Atlantic
2. StarTech
3. Strong
4. Or approved equal.

2.26 COMPONENTS –AV RACK FLOOR STANDING

A. Performance/Design Criteria

1. Metal open frame rack
2. Caster base may need to be purchased separately.
3. EIA Compliant
4. Usable depth maximum 20 inches.
5. Weight Capacity minimum 125 lbs
6. See drawings for size, quantity, and locations

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Middle Atlantic
2. StarTech
3. Strong
4. Or approved equal.

2.27 COMPONENTS –PAGING SYSTEM

A. Performance/Design Criteria

1. Speakers will be ceiling mounted and will be the same ceiling speakers used in the MPR.
2. Speaker Frequency range within 20Hz – 20kHz
3. Speaker coverage angle minimum 100 degrees
4. Speakers will have multi-tap 70V transformers
5. Speaker grilles will be paintable.
6. Amplifiers will have enough output power per channel to support all speakers on a floor using a single speaker channel.
7. Control processor to provide setup and configuration of paging zones
8. Paging system to support integration with the client phone system for use of paging over phone extensions.
9. See drawings for size, quantity, and locations

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bogen
2. QSC
3. Valcom
4. Or approved equal.

2.28 COMPONENTS – RF-CATV HORIZONTAL RG-6 CABLES

A. Performance/Design Criteria

1. 18 American Wire Gauge (AWG)
2. Solid Bare Copper Covered Steel Conductor
3. Fluorinated Ethylene Propylene Insulation
4. Foil + 60% Aluminum Braid + Foil + 40% Aluminum Braid Shield,
5. FlamarrestJacket
6. Overall diameter 0.248 in (6.30 mm)
7. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.29 COMPONENTS – RF-CATV VERTICAL RG-11 CABLES

A. Performance/Design Criteria

1. 14 AWG
2. Solid .064" bare copper-covered steel conductor
3. Foam Fluorinated Ethylene Propylene Insulation
4. Nominal Conductor DCR 11 Ohm/1000ft
5. Nominal Outer Shield DCR 1.8 Ohm/1000ft
6. Outer Conductor DCR 1.8 Ohm/1000ft
7. Nom. Capacitance Conductor to Shield 16.2 pF/ft
8. Nominal Characteristic Impedance 75 ohm
9. Frequency 5 - 400 MHz
10. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.30 COMPONENTS – VIDEO SDI COAX

A. Performance/Design Criteria

1. 20 AWG
2. Solid 0.032" bare copper-covered steel conductor
3. Foam Fluorinated Ethylene Propylene Insulation
4. Overall Diameter 0.196 in (4.98 mm)
5. 23dB minimum return loss @ 5 - 1600 MHz
6. 21dB minimum return loss @ 1600 - 4500 MHz
7. 15 dB minimum return loss @ 4500 - 6000 MHz
8. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.31 COMPONENTS – CONTROL CABLE 4 CONDUCTOR SHIELDED

A. Performance/Design Criteria

1. 1 Pair 22 AWG stranded (7x30) tinned copper (data) with foam Foam Fluorinated Ethylene Propylene Insulation shield with drain.
2. 2 Conductor 18 gauge stranded (16x30) tinned copper conductor (power)
3. Overall Diameter 0.205 in (5.21 mm)
4. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.32 COMPONENTS – CONTROL CABLE 12 CONDUCTOR SHIELDED

A. Performance/Design Criteria

1. 12 conductor 18 gauge
2. 7x26 stranding
3. Bare copper
4. Overall Diameter 0.312 in (7.92 mm)
5. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.33 COMPONENTS – LINE LEVEL AUDIO CABLE

A. Performance/Design Criteria

1. 1 pair 22 gauge
2. 7x30 stranding
3. Fluorinated Ethylene Propylene Insulation
4. Overall Diameter 0.127 in (3.23 mm)
5. Nom. Capacitance Cond-to-Cond 35 pF/ft (110 pF/m)
6. Nom. Capacitance Cond-to-Other (Conds + Shield)
7. Nom. Velocity of Prop. 69%
8. Max. Current 4.4 Amps per conductor @ 25°C
9. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.34 COMPONENTS – SPEAKER LEVEL AUDIO CABLE FOR 8 OHM PROGRAM SPEAKERS

A. Performance/Design Criteria

1. 2 conductor 22 gauge
2. 7x30 stranding
3. Fluorinated Ethylene Propylene Insulation
4. Overall Diameter 0.127 in (3.23 mm)
5. Nom. Capacitance Cond-to-Cond 35 pF/ft (110 pF/m)
6. Nom. Capacitance Cond-to-Other (Conds + Shield)
7. Nom. Velocity of Prop. 69%
8. Max. Current 4.4 Amps per conductor @ 25°C
9. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.35 COMPONENTS – SPEAKER LEVEL AUDIO CABLE FOR 70 VOLT SPEAKERS

A. Performance/Design Criteria

1. 2 conductor 18 gauge
2. 19x30 stranding
3. Overall Diameter 0.178 in
4. Max. Current 4.8 Amps per conductor @ 25°C
5. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.36 COMPONENTS – MULTI-CHANNEL AUDIO CABLE

A. Performance/Design Criteria

1. 6 pairs 22 gauge

2. 7x30 stranding
3. Overall Diameter 0.321 in
4. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

2.37 COMPONENTS – DIGITAL AUDIO CABLE

A. Performance/Design Criteria

1. 1 pair 24 gauge
2. 7x32 stranding
3. Overall Diameter 0.165 in
4. Plenum Rated

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

C. Components – Category 6

1. 4 pair 24 gauge
2. Overall Diameter 0.23 in
3. Plenum Rated

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Belden
2. Canare
3. Liberty
4. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. General

1. Installation will include the delivery to the installation site, unloading, setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of the system components, equipment alignment and adjustment, programming and configuration and all other work whether or not expressly required herein which is necessary to result in complete and fully operational systems.

2. Prior to ordering equipment, the contractor will coordinate the frequencies of all wireless devices to prevent unwanted interaction between devices and rooms. This includes, but is not limited to, wireless microphones, assisted listening system devices, wireless control panels, etc.

3. All accessories, including rack mounting hardware, power supplies, etc., will be obtained from the original equipment manufacturer. Unless otherwise noted or specified, third party accessories will not be used.

B. Physical Installation

1. All equipment will be firmly secured in place unless requirements of portability dictate otherwise.

2. All equipment will have an engraved plaque permanently affixed, denoting its function.

3. Fastenings and supports will be adequate to support their loads with a safety factor of at least three. All boxes, equipment, etc., will be secured plumb and square.

4. In the installation of equipment and cable, consideration will be given not only to operational efficiency, but also to overall aesthetic factors.

5. Trim and Escutcheon Components

   a. To ensure a proper finished appearance, the Contractor will furnish and install trim/escutcheon components at all conditions where A/V components pass through the finished ceilings. This would include but not be limited to video projector supports, television monitor/receiver supports and any other component which is not specifically supplied with integral flanges/trim components; i.e. speaker mounts, assistance listening devices, etc.
   b. The visible component of any trim should be minimal in size, preferably no wider than 1/2”. All trim components at the ceiling plane will be finished to match the approved ceiling finish. The contractor should obtain a sample from the General Contractor, including any custom color information, or standard color numbers.
   c. All visible components and finish options will be submitted to the Commissioner for review and approval prior to fabrication.

C. Cable Installation

1. All wire bundles are to be neat and combed free of cable crossovers.

2. All cables, regardless of length, will be marked with a permanent, self-laminating wrap-around number or letter cable marker at both ends, similar to the Panduit "Pan-Code" system. Labels must be computer-generated for legibility. Wire labels done by hand in the field must be replaced with computer generated labels. There will be no unmarked cables at any place in the system. Marking codes used on cables will correspond to codes shown on drawings and or run sheets. All labeling must be reviewed and approved by the Commissioner prior to installation as part of the shop drawing process.

3. All cables will be grouped according to the signals being carried. In order to reduce signal contamination, separate groups will be formed for the following cable families:

   a. Power cables
   b. Control cables
   c. Video cables
   d. Audio cables carrying signals less than – 20 dBm
   e. Audio cables carrying signals between – 20 dBm and +20 dBm
   f. Audio cables carrying signals above +20 dBm

4. As a general practice, all power cables, control cables, and high level cables will be run on the left side of an equipment rack as viewed from the rear. All other cables will be run on the right side of an equipment rack, as viewed from the rear.

5. Cables ties will be placed at appropriate intervals of no greater than six inches for vertical bundles, two inches for horizontal bundles.

6. All vertical cable bundles will be attached to the rack frame.

7. All cables will be continuous lengths without splices. All system wire, after being cut and stripped, will have the wire strands twisted back to their original lay and be terminated by approved soldered or mechanical means. Except where noted otherwise in the specifications, no bare wire terminations will be accepted. Heat-shrink tubing will be used to insulate the ground or drain wire. Unused wires at the end of a cable will remain unstripped and will be laid back and held in place with wire ties.

8. All solder connections will be made with rosin-core solder using temperature-controlled solder stations. Care will be taken to avoid cold or cracked solder joints. Any connections that do not appear to be clean and shiny, or which show signs of cracking, will be resoldered by the contractor before final acceptance of the system.

9. Mechanical connections using insulated, crimp-type connectors will be bonded to the connector by soldering the wire to the metal part of the connector.

10. Connections made with screw actuated pressure type terminal strips will be made by stripping approximately 1/4 inch of insulation from the stranded conductor. Then the un-tinned wire will be inserted into the terminal and the screw tightened using a secure fitting precision screwdriver.

11. Terminal blocks, boards, strips or connectors will be furnished for all cables which interface with racks, cabinets, consoles, or equipment modules. No audio cables will run directly to the audio patch panel jacks. Each audio patch panel will be furnished with an audio terminal block, and all audio cables to and from the audio patch panel will terminate on this block.

12. All wire markers will face a common direction.

13. All cables will have proper connector housing.

14. Cables will not protrude from the back of racks.

15. All cable entry will be through the tops of racks or through entrance holes in the base of the rack. No cable will enter racks through front, rear or side panel openings.

16. It is the responsibility of the Contractor to verify, furnish and install the correct cable television (CATV) cable type and connectors, as per the local CATV provider.

17. Unless otherwise noted, all video and computer video cables are to be terminated using seventy-five ohm (75 Ohm) connectors, with a captive center pin.

18. Cables running in plenum areas without conduit will be plenum rated cable, and match the specified cable above. It is the responsibility of the Contractor to inspect the electrical drawings, and verify in what spaces plenum cable will be used. No claims for additional monies, based on the use of plenum cable, will be allowed.

19. All cables that can be terminated in the field (except video and pulse cables, which must be cut to an electrical length) will be cut to the length dictated by the run. No splices will be permitted in any pull boxes without prior permission of the Commissioner. For equipment mounted on casters, in drawers or on slides, the interconnecting cables will be provided with a service loop of appropriate length.

20. No cable will be installed with a bend radius less than that recommended by the cable manufacturer.

21. Where cables are installed in niches, ensure that the cables are black, unless otherwise directed, to reduce visibility from the audience.

22. Where cables are visible, the cables will be sheathed in a color wrap that has been submitted for approval by the Commissioner.

D. Cable Separation

1. Cable separation of cables for runs greater than 24’.

    a. Microphone Level – 12” from all other circuits.
    b. Line Level and Control – 12” from any circuit with signal of 20dB or greater than Line Level and Control cables.
    c. Speaker level circuits – 12” from other circuits.
    d. Video and Data – 12” from any circuit with signal of 20dB or greater than Video and Data.
    e. AC Power Circuits – 12” from all other circuits.
    f. Required conduit separation are given for all audiovisual pathways on plans

E. Cable Support

1. Individual runs throughout building – Support cable at 600mm on center and 100mm at any change in direction. Support from building structure. Cables on top of ceiling tiles will be rejected. Cable supported by ceiling grid support wires will be rejected.

2. Cable Bundles – Where multiple cable combine support at 300mm on center and 100mm at any change in direction. Support from building structure. Cables on top of ceiling tiles will be rejected. Cable supported by ceiling grid support wires will be rejected.

F. Rack Cabling

1. Neatly guide and lace cables.

2. Route Cables from components to lacing bars installed on rear rack rail.

3. Provide services loops for each cable.

4. Cable separation of cables for runs within Equipment rack.

   a. Microphone Level – 50mm from all other circuits.
   b. Line Level and Control – 50 mm from any circuit with signal of 20dB or greater than Line Level and Control cables.
   c. Speaker level circuits – 50mm from other circuits.
   d. Video and Data – 50 mm from any circuit with signal of 20dB or greater than Video and Data.
   e. AC Power Circuits – 50mm from all other circuits.

G. Approved Wire Termination Means

1. Solder Connections – For connectors utilizing Solder Cups

2. Terminal strip Connectors – For termination of blunt cut cables, cable to be tinned prior to termination

3. Multi Pin connectors – Utilize connector manufacturers crimper

4. Crimp Cap Terminations – For Loudspeaker circuits at individual devices. Distribution cable termination to utilize terminal strip connectors.

H. Connection Plate Receptacles (unless otherwise specified)

1. All connection plate receptacles must be labeled properly according to City of New York approved labeling scheme.

2. Audio (microphone or line level) – XLR type.

3. Audio (loudspeaker level) – Binding Post connector type.

4. Intercom – XLR or ¼ inch diameter tip/ring/sleeve type, or as required by the intercom system. Jack will be insulated from panel type.

5. Video – BNC type.

6. VGA – DB-15HD jack, isolated from panel type, with hex nuts

7. DVI (Inclusive of DVI-A, DVI-I and DVI-D signal types) – DVI-I type connector unless otherwise specified.

8. HDMI – HDMI with locking nut.

9. USB – USB Type A

10. Category 5/6 – RJ45 Type

11. RF – "F" type. Receptacles will be insulated from panel type.

12. Note: All connectors on wall plates, or in other exposed locations, are to be recessed.

I. Patch Panels

1. Patch Panel Assignments

   a. All patch panels will be wired so that signal "sources" (outputs from) appear on the upper row of a row pair; and all "loads" (inputs to) appear on the lower row of a row pair.

2. Patch Panel Designation Strips

   a. All audio and video patch panel designation strips will utilize alphanumeric identifications and descriptive information. The jack position in each horizontal row will be numbered sequentially from left to right. The horizontal jack rows will be lettered sequentially from top to bottom. The alphanumeric identification of each jack will be included on the functional block drawings, as well as on reproductions of these drawings, which will be mounted in an appropriate location near the patch bays.

J. Mounting Heights

1. Coordinate locations of the following with mounting heights as indicated on Architectural, Electrical and Audiovisual drawings.

   a. Technical wall plates

      1) AV input/output connections
      2) Flat panel display panel connections
      3) Video projector connections
      4) Annotation panel connections
      5) Networked Digital Clocks
      6) PTZ cameras
      7) Wall mounted speaker boxes

   b. Control panels
   c. Pull boxes
   d. Other devices as required

K. Grounding Procedures

1. In order to minimize problems resulting from improper grounding, and to achieve maximum signal-to-noise ratios, the following grounding practices will be adhered to in order to maintain the integrity of the grounding system:

   a. Because of the great number of possible variations in grounding systems, it will be the responsibility of the Contractor to follow good engineering practice, as outlined below, and to deviate from these practices only when necessary to minimize crosstalk, ground loops, ground-induced noise, and to maximize signal-to-noise ratios in the audio, video, and control systems.
   b. System Power Ground: A single primary "system ground" will be established for the system in each particular area. All grounding conductors in that area will connect to this primary system ground.

      1) The system ground will be provided at the audio equipment rack for the area, and will consist of a copper bar of sufficient size to accommodate all secondary ground conductors. A copper conductor having a maximum of 0.1 Ohms total resistance will connect the primary system ground bar to the nearest approved ground. The Contractor will be responsible for determining if the metallic conduit is properly electrically bonded to the building ground system.
      2) Secondary system grounding conductors will be provided between all racks, audio consoles, and audiovisual system equipment local to the area. Each of these grounding conductors will have a maximum of 0.1 Ohms total resistance.
      3) Under no conditions will the AC neutral conductor, either in the power panel or in a receptacle outlet, be used as a system ground, except as specifically defined by NFPA 70 for bonding.
      4) Ungrounded equipment with either an inline transformer or a 2-prong plug, will be bonded to the rack bus bar using #12awg cable.

   c. Audio Cable Shields

      1) All audio cable shields will be grounded at one point only. There are no exceptions. For inter and intra-rack wiring, this requires that the shield be connected at one end only. For ungrounded portable equipment, such as microphones, the shield will be connected at both ends but grounded at only one end.

   d. Video Receptacles

      1) All video receptacles that are provided and installed by the Contractor will be insulated from the mounting panel, outlet box, or wireway. Unless otherwise detailed herein, this will be accomplished by using insulated-from-panel type receptacles.

   e. Audio Receptacles

      1) All audio receptacles that are provided and installed by the Contractor will be insulated from the mounting panel, outlet box, or wireway. Unless otherwise detailed herein, this will be accomplished by using insulated-from-panel type receptacles.

3.3 PERFORMANCE STANDARDS

A. Unless restricted by the published specifications of a particular piece of equipment, or unless otherwise required under the Detailed Specifications, the following performance standards will be met by each system. The signal paths for the above Performance Standards will be as follows: From all source inputs to all signal destinations. See Contractor System Checkout Section III-T for testing procedures.

1. Analog Audio

   a. Frequency Response within plus or minus 0.5dB, 20 Hz to 20,000 Hz.
   b. Signal to Noise Ratio greater than 90dB including crosstalk and hum at all input / output levels.
   c. Total Harmonic Distortion 0.05% maximum from 20 Hz to 20,000 Hz.
   d. Input Levels

      1) Microphone (Nominal) -50dbu
      2) Overload (Minimum gain) -5dbu
      3) Maximum Gain -26dbu
      4) Line (Nominal) +4dbu
      5) Overload (Minimum gain) +24dbu
      6) Maximum Gain +9dbu
      7) Input Common Mode Rejection >100db
      8) Output Levels
      9) Line (Nominal) +4dbu
      10) Maximum +24dbu
      11) Output Impedance < 0.5 Ohms
      12) Load Impedance >150 Ohms

2. Analog Video (signal)

   a. Frequency Response Within plus or minus 0.5dB, DC to 4.2 MHz
   b. Signal to Noise Ratio 55 dB minimum
      (peak to RMS) unweighted,DC to 4.2 MHz
   c. Crosstalk 45 dB minimum
      unweighted DC to 4.2 MHz
   d. Line and Field Tilt: 2% maximum
   e. Differential Gain: 3% maximum
   f. Differential Gain: 2 degrees maximum

3. SDI – Per SMPTE 259M

4. HD SDI – Per SMPTE 292M

5. HD SDI (Dual Link) – Per SMPTE 424M

6. 3G SDI – Per SMPTE 424M

7. HDMI – Per HDMI Ver. 1.3b

8. DVI – Per DVI Ver. 1.0

9. Analog NTSC Video

10. Composite Video Signal

    a. Signal 1V P-P 75 Ω(3.58, 4.43MHz) NTSC, PAL, or SECAM as appropriate

11. S-Video Signal

    a. Signal Y: 1.0V p-p, 75 ΩC: 0.286V p-p, 75Ω(3.58, 4.43MHz) NTSC, PAL, or SECAM as appropriate

12. Component Video (Beta Component)

    a. Signal Y: 1.0V p-p, 75 ΩPB/CB: 07V p-p, 75ΩPR/CR: 0.7V p-p, 75 Ω

13. RF Broadband

    a. The RF Broadband system will meet or exceed the published standards of the following organizations:

        1) FCC Part 15 Rules and Regulations: Radio Frequency Devices
        2) FCC Part 76 Rules and Regulations: Cable Television Service
        3) NCTA-02 Recommended Practices for Measurements on Cable Television Systems.

    b. Visual Carrier Level +7 +/- 3dBMv for each tap at channel WW(433.25 MHz)
    c. Visual Carrier Level +5 +/- 3dBMv for each tap at channel 2(55.25 MHz)
    d. Visual Carrier to Noise Ratio 42 dB minimum on any channel (4MHz bandwidth)
    e. Maximum Loss from common 45 dB or less point to any tap at channel WW(433.25 MHz)
    f. Maximum Loss from common 37 dB or less point to any tap at channel 2(55.25 MHz)

14. Audio Video Bridging (AVB)

    a. IEEE 802.1AS: Timing and Synchronization for Time-Sensitive Applications
    b. IEEE 802.1Qat: Stream Reservation Protocol (SRP)
    c. IEEE 802.1Qav: Forwarding and Queuing for Time-Sensitive Streams
    d. IEEE 802.1BA: Audio Video Bridging Systems

15. Cobranet Audio

    a. Protocol not subject to performance-based substitution.

16. Dante Audio

    a. Protocol not subject to performance-based substitution.

17. Audiovisual System, Control System and User Interface Programming

    a. Control system user interfaces pages and programming will be designed for this project exclusively. While there are a great number of design approaches to designing the user interface, the following guidelines will be adhered to:

1) The use of custom system programming from prior projects and/or 'modules' provided by a given manufacturer or programmer may or may not meet the functional intent of the systems and work described herein. It is the responsibility of the Contractor to meet the functional intent of the systems in this specification, including any and all necessary modification of program code or creation of custom modules as required.
2) The operation(s) of all system(s) are to match the functional intent already implemented at the City of New York's facilities as applicable.
3) All panels are to have the time and date as icons, in the same position on every page.
4) All panels are to have a title, indicating the piece of equipment and/or functionality being controlled.
5) Final programming will include capability to remotely control all functions of the audiovisual system. Only functions required for normal use will appear on top level pages while underlying "Tech Pages" will provide access to full manufacturer's remote control functionality.
6) Devices similar in nature will be programmed to operate with a common format.
7) No individual component will be programmed to function atypically.
8) Whenever the same button appears on more than one page, it will be in the same position on each page.
9) Where feasible, multi-level access to controls should be implemented. See paragraph "e", above.

b. During performance testing, all equipment will be operated under standard conditions as recommended by the manufacturer.
c. Please see Detailed Specifications for further information on specific control system programming requirements.

B. Performance Test Signal Paths

1. The signal paths for the above Performance Standards will be as follows:

a. Audio:

1) From all source inputs (for microphones, audio tape units, video tape units, etc.) through all mixers, switchers, etc., to all signal destinations.

b. Video:

1) From all sources of the above signal paths. This will not exempt the Contractor from the responsibility of checking all paths and outlets for appropriate compliance with the Performance Standards, see section below for detailed requirements.

C. Optical

1. All optical projection systems will meet the following performance standards:

a. The total averaged light output from a projector, in lumens, will be within plus-or-minus 15% of that specified by the projector manufacturer.
b. The corner location will be defined as the four points determined by intersecting lines drawn 5% of the distance in from the focused edges of the image.

c. The light meter used for the above measurements will be a properly calibrated foot-candle (or lux) meter and will be cosine-corrected.

2. Projectors, lenses, and mirrors will be solidly mounted and braced, so that there will be no observable movement in the image induced by motor vibration or other mechanical operations.

3.4 CONTRACTOR SYSTEM CHECKOUT

A. Before tests are scheduled, the Contractor will perform a systems checkout based upon an approved testing procedure for the systems. The Contractor will furnish all required test equipment and will perform all work necessary to determine and/or modify performance of the system to meet the requirements of this specification. The Contractor will submit a testing plan which will be in accordance with ANSI-INFOCOMM standard 10-2013-Audiovisual Systems Performance verification for approval by the individual or firm representing the City of New York during the Audiovisual Installation. At a minimum, the following sub-components of the Audiovisual System will be tested and verified:

1. Cable and Connectors

   a. All cables and connectors will be tested and verified to comply with the manufacturer's specifications and design intent.
   b. Cable test results will be submitted in advance of testing for review by the Commissioner.

2. Devices

   a. All devices will meet the functionality as specified by manufacturer.
   b. If any device is found to deviate from the manufacturer's functionality it will be replaced by the Contractor at no cost to the City of New York.

3. Signal Types

   a. The Audiovisual System will be tested to comply with all video and audio standards as specified in the Performance Standards section and described by the design intent.

4. System Function

   a. The cables and connectors, devices, and signal types will meet the functional requirements as specified by the design intent.
   b. Acceptable testing procedures may include but is not limited to that which is described in the detailed specifications such as (streaming, push-to-talk, annotation, etc.)

5. Document that all matrix switching crosspoints have been tested and verified.

6. Provide documentation that all digital audio bundles and audio signal lines have been tested and verified.

7. Test all audio and video systems for compliance with the Performance Standards, using the example procedure outlined in appendix A:

   a. Test Equipment: The following test equipment (or submit equivalent for approval) will be used to test the systems on site.

1) Audio check:

a) Time based measurement system, Goldline TEF20 or SIA Smaart live with laptop PC, calibrated omnidirectional mic, and appropriate interface
b) Audio test set, Audio Precision ATS-1DD
c) Media representative of all types found in the subject system
d) Audio cables as required to connect test equipment to the system
e) Set of terminations, adapters etc.

2) Video checks:

a) Video, Component, RGBS, RGBHV and Digital video signal generator.
b) Digital Video test generator with EDID and HDCP components.
c) Media and portable hardware (i.e laptop) representative of all types found in the subject system including but not limited to Blu-ray players and discs (provide discs with and without HDCP encrypted content), mobile PC/Tablets.
d) RGB cable, Extron BNC-5-6'HR
e) Video cable
f) Set of terminations, 'T' pieces etc.

3) Gain Setting

a) Adjust all systems (end to end within a system) for maximum signal-to-noise ratio. No hiss should be audible through any loudspeaker at the completion of gain structure setting, and all audio gain stages should clip simultaneously.

8. Signal Paths

a. Video/Audio

1) Connect the output of the video signal generator to a floor box/table/rack connector and select the "Full Field Color Bar" signal. Connect the combined waveform monitor/vectorscope to a final output point, e.g. an input to a picture monitor or video projector. Ensure that the test signal is routed to the selected output.
2) Measure and record the signal amplitudes.
3) Repeat item '1' after selecting the "Multiburst, 50 IRE" test signal.
4) Measure and record the signal amplitudes.
5) Repeat item '1' after selecting the "Modulated 5-step" test signal.
6) Measure and record the signal differential phase and gain.
7) Repeat item #'s '1' through '6' for other video signal paths.
8) Repeat item '1' after selecting the Window test signal.
9) Measure and record the signal line and field tilt.
10) Repeat item '1' after connecting the Black Burst signal from a rear mounted connector.
11) Measure and record the signal/noise ratio.
12) Connect the output of the audio test set to a floor box/table/rack program audio connector and connect the input of the audio test set to a final output point, e.g. an input to a program speaker power amplifier. Ensure that the test signal is routed to the selected output, that the volume control is set to 100% and that the equalizers are bypassed.

13) Measure and record the signal/noise ratio, total harmonic distortion and frequency response.
14) Repeat items ‘12’ and ‘13’ for other audio signal paths.
15) Connect the output of the audio test set to a floor box/table/rack speech audio connector and connect the input of the audio test set to a final output point, e.g. an input to a speech speaker power amplifier. Ensure that the test signal is routed to the selected output, that the volume control is set to 100% and that the equalizer is bypassed.
16) Measure and record the signal/noise ratio, total harmonic distortion and frequency response.
17) Repeat items ‘15’ and ‘16’ for other audio signal paths.
18) DVI: Connect the DVI output of the signal generator to a floorbox/table/rack connector and select the SMPTE & PLUGE signal at the various computer scan rates as follows:

    a) 640 x 480 31.5 kHz H, 60 Hz V
    b) 640 x 480 37.5 kHz H, 75 Hz V
    c) 800 x 600 38 kHz H, 60 Hz V
    d) 832 x 624 49.7 kHz H, 75 Hz V
    e) 1024 x 768 48 kHz H, 60 Hz V
    f) 1280 x 768 48 kHz H, 60 Hz V
    g) 1366 x 768 47.8 kHz H, 60 Hz V
    h) 1280 x 1024 64 kHz H, 60 Hz V
    i) 1400 x 1050 63.9 kHz H, 60 Hz V
    j) HD 720p 45 kHz H, 60 Hz V
    k) HD 1080i 33.75 kHz H, 30/60 Hz V
    l) HD 1080p 33.75 kHz H, 30/60 Hz V

19) Check that the image is correctly displayed on the picture monitor(s) and/or by the video projector.
20) Repeat item ‘2’ using Crosshatch signal, checkerboard signal and H Pattern signal.
21) Repeat item ‘2’ for other DVI connection locations.
22) Connect the output of the audio signal generator to a floorbox/table/rack ‘Left’ and ‘Right’ connectors and select the 1 kHz tone. Check that the signal is emitted from the left and right program speakers.
23) Repeat item ‘v’ for other audio connection location.

b. At the conclusion of the tests, return all equipment settings to previously calibrated positions.
c. Provide written records of all test results in spreadsheet form.
d. Check all control functions, from all controlling devices to all controlled devices, for proper operations.
e. Adjust, balance, and align all equipment for optimum quality and to meet the manufacturer’s published specifications. Establish and mark normal settings for all level controls, and record these settings in the “System Operation and Maintenance Manual”.
f. Check all optical projection images for average light level, light fall-off, and image alignment and size to comply with the Performance Standards and specifications drawings. Check to determine that all projectors, projector bases, carts, tables, and mirrors are rigid and vibration-less in operation.
g. Maintain documentation of all performance tests for reference by the Commissioner during the System Acceptance Tests.

3.5 TESTING

A. Testing will not be performed until the Contractor's System Checkout has been completed and the test results have been reviewed. The testing will be supervised by the Commissioner and will consist of the following at a minimum:

1. A physical inventory of all equipment on site and will be compared to equipment lists in the contract documents.

2. The operation of all system equipment will be demonstrated by the Contractor.

3. Review of final As-Build documentation as described in the "Contractor's Documentation" section of this specification.

4. Both subjective and objective tests will be required by the Commissioner to determine compliance with the specifications. The Contractor will be responsible for providing test equipment for these tests.

5. All final, "as-built" drawings, run sheets, manuals, and other required documents, as detailed in Part 1, will be on hand. Two complete sets of these documents will be delivered to the City of New York at this time. (One complete set will have been delivered to the Commissioner prior to the scheduling of Acceptance Tests).

3.6 USER INSTRUCTION

A. The Contractor will provide on-the-job instruction by a suitably qualified instructor, to personnel designated by the City of New York, to instruct them in the operation and maintenance of the systems. In the event the Contractor does not have qualified instructors on staff for certain sophisticated equipment, the contractor will provide a manufacturer's representative for such instruction to the City of New York at no additional cost. All instruction will take place after the systems are operational and accepted. There will be a minimum of 80 hours of end-user instruction included in these specification durations to be specified by the City of New York.

END OF SECTION 274116

SECTION 280010 –SUPPLEMENTAL REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Supplemental requirements generally applicable to the Work specified in Division 28.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for abbreviations and acronyms for electrical terms and units of measure, abbreviations and acronyms for electrical raceway types, abbreviations and acronyms for electrical cable types, and additional coordination drawing submittal requirements.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 REFERENCES

A. Abbreviations and Acronyms for Electronic Safety and Security:

1. BMS: Building management system.
2. FACU: Fire-alarm control unit.
3. PoE: Power over Ethernet.
4. POTS: Plain old telephone service. See "public switched telephone network."
5. TCP/IP: Transmission control protocol/Internet protocol.

B. Definitions for Electronic Safety and Security:

1. Voice over Internet Protocol (VoIP): Digital telephone packet technology that uses the internet for its transmission medium.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Provide emergency operation, normal operation, and preventive maintenance manuals for each system, equipment, and device listed below:

a. Access Control System

b. Video Surveilence system

c. Intercom Systems

d. Intrusion Detection System .

2. Include the following information:

a. Manufacturer's operating specifications.
b. User's guides for software and hardware.
c. Schedule of maintenance material items recommended to be stored at Project site.
d. Manufacturer's instructions for setting field-adjustable components.
e. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.
5. Testing and adjusting of panic and emergency power features.

1.6 QUALIFICATIONS

A. Security Design Professional: Design professional with active Physical Security Professional (PSP) certification issued by American Society for Industrial Security (ASIS) and with documented experience managing installation of security systems in similar size and complexity.

B. Security Testing Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by Commissioner.

1.7 FIELD CONDITIONS

A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 28 must comply with requirements specified in Section 260011 "Facility Performance Requirements for Electrical."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF ELECTRONIC SAFETY AND SECURITY WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' instructions, comply with NFPA 70, NFPA 72, NFPA 731, and NECA NEIS 1 for installation of Work specified in Division 28. Consult Commissioner for resolution of conflicting requirements.

3.3 CLOSEOUT ACTIVITIES

A. Demonstration:

1. Demonstrate to City of New York's personnel how to operate the following systems and equipment:

a. Provide instructional video demonstrating operation by building occupants of intercom entry system specified in Section 281523 "Intercom Entry Systems."

2. Provide video recordings of demonstrations to the Commissioner.

B. Instruction:

1. Instruct City of New York's personnel on the following topics:

a. How to adjust and operate access control workstations, software, and databases specified in Section 281300 "Access Control Software and Database Management."
b. How to adjust and operate hardware, enroll users, and issue user credentials specified in Section 281500 "Integrated Access Control Hardware Devices."
c. How to enroll users and issue user credentials specified in Section 281513 "Access Control Credentials."
d. How to enroll users and issue user credentials specified in Section 281519 "Access Control Remote Devices."
e. How to adjust and operate hardware, enroll users, and issue user credentials specified in Section 281523 "Intercom Entry Systems."
f. How to adjust and operate video surveillance equipment specified in Section 282000 "Video Surveillance."
g. How to adjust and operate intrusion detection system equipment specified in Section 283100 "Intrusion Detection" Comply with documentation and user training provisions in Chapter 4 of NFPA 731.

h. How to adjust and operate FACUs, their battery backup, graphic annunciators, and remote annunciators specified in Section 284621.11 "Addressable Fire-Alarm Systems."

2. Provide video recordings of demonstration sessions to City of New York.

END OF SECTION 280010

SECTION 281300 - ACCESS CONTROL SOFTWARE AND DATABASE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Software for access control system units.
2. Software for access control system supplementary computer equipment.

B. Related Requirements:

1. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 281500 "Integrated Access Control Hardware Devices" for access control field devices controlled by software specified in this Section.

1.3 DEFINITIONS

A. RAM: Random-access memory.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Software for access control system units.
2. Software for access control system supplementary computer equipment.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and instructions issued to Installer by manufacturer for the following:

1. Installation and programming instructions for operating system software, including all applicable software add-ons.
2. Manufacturer's recommended setup and testing procedure for operating system software and applicable software add-ons.
3. Troubleshooting instructions for operating system software and applicable software add-ons.
4. Installation and programming instructions for antivirus and security protection software.
5. Manufacturer's recommended setup and testing procedure for antivirus and security protection software.
6. Troubleshooting instructions for antivirus and security protection software.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOFTWARE FOR ACCESS CONTROL SYSTEM UNITS

A. Description: This category covers software products intended for installation on access control system units.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70 and NFPA 72, by qualified electrical testing laboratory and marked for intended location and application.
b. Comply with NFPA 1, NFPA 730, NFPA 731, and ICC IBC.

2. Listing Criteria:

a. Cybersecurity: UL CCN CYBR; including UL 2900-1 and UL 2900-2-3.
b. Access Control System Functionality: UL CCN ALVY; including UL 294.
c. Hardware that Interfaces with Fire Alarm or Mass Notification: UL CCN UOJK; including UL 864.

C. Access Control System Unit Operating System Software:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cansec Systems Ltd.
b. HID Global; ASSA ABLOY.
c. Honeywell Commercial Security; Honeywell International, Inc.
d. LenelS2; Carrier Global Corporation.
e. Tyco Software House; Tyco International, Ltd.
f. Or approved equal.

2. Additional Characteristics:

   a. Provides event logging, notification, and escalation.
   b. Provides threat-level management and response actions.
   c. Provides dashboard view of system health and status.
   d. Maintains credential-driven user records and access history.
   e. Supports network-connected credential readers and controlled doors.
   f. Supports add-on software.
   g. Supports video-surveillance system integration.
   h. Provides email and text message alerts.

3. Options:

   a. Operating System: Windows 10.
   b. User Interface: Web browser mobile app.
   c. Memory: 4 GB RAM.
   d. Screen Resolution: 1920x1080.
   e. Number of Cardholders: Up to 1000.
   f. Number of Supported Readers: Up to 100.
   g. Number of Inputs: 128.
   h. Number of Outputs: 128.
   i. Simultaneous Users: Five.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF ACCESS CONTROL SOFTWARE

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Installation of Access Control Software: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with requirements in guide information for UL CCN ALVY, UL CCN CYBR, and UL CCN UOJK.
2. Consult Commissioner for resolution of conflicting requirements.

C. Interfaces with Other Work:

1. Coordinate installation of new access control software with existing equipment and network conditions.
2. Coordinate with Section 284621.11 "Addressable Fire-Alarm Systems" for interfacing access control system inputs/outputs with fire-alarm system inputs/outputs.

3.3 SYSTEM STARTUP

A. Perform startup service.

1. Complete software installation and startup checks in accordance with manufacturer's published instructions.

END OF SECTION 281300

SECTION 281500 - INTEGRATED ACCESS CONTROL HARDWARE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Access control credentials.

B. Related Requirements:

1. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
2. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
3. Section 281513 "Access Control Credentials" for additional access control hardware credential products.
4. Section 281519 "Access Control Remote Devices" for additional wireless access control hardware device products.
5. Section 281523 "Intercom Entry Systems" for access control intercom entry products.

1.3 DEFINITIONS

A. NFC: Near Field Communications.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Integrated Credential Readers and Entry Management:

a. Credential readers.

2. Access Control Credentials:

a. Access control cards.

B. Shop Drawings:

1. Project general notes.
2. Device layout.
3. Block diagram and cable/conduit routing.
4. System communications details.
5. System mounting details.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 REGULATORY AGENCY APPROVALS FOR EGRESS MANAGEMENT DEVICES

A. Submittals for egress management devices requiring approval by The NYC Department of Buildings must be signed and sealed by qualified life safety professional engineer licensed in the State of New York responsible for their preparation. Obtain approval by The NYC Department of Buildings prior to submitting for action by Commissioner.

B. Submittals for egress management devices require action by Commissioner prior to submitting for approval by The NYC Department of Buildings.

1.8 WARRANTY

A. Integrated Credential Readers and Entry Management Devices Warranty:

1. Special Installer Warranty: Installer warrants that fabricated and installed integrated credential readers and entry management devices perform in accordance with specified requirements and agrees to repair or replace components that fail to perform as specified within warranty period.

a. Warranty Period: Two years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 INTEGRATED CREDENTIAL READERS AND ENTRY MANAGEMENT

A. Proximity Reader for Card, Fob, or Smartphone :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AMAG Technology; G4S USA.

b. aptiQ; an Allegion brand.
c. HID Global; ASSA ABLOY.
d. Or approved equal.

2. Source Limitations: Obtain products from single manufacturer.
3. Performance Criteria:

a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and application.
b. Listing Criteria:

1) UL CCN ALVY; including UL 294.
2) Plastic Enclosure: UL CCN QMFZ2; including UL 94.

c. General Characteristics: Visual LED indication of card read.

4. Options:

a. Enclosure Rating: IEC 60529, .
b. Input Voltage: 5 to 16 V(dc).
c. Operating Temperature: Minus 40 to plus 160 deg F.
d. Read Range: Up to 3 inch.
e. Transmit Frequency: 125 kHz 13.56 MHz 2.4 GHz.
f. Materials: Long-wearing polymeric plastic.
g. Colors: Black.
h. Climate: Indoor.
i. Size: Single gang.

5. Accessories:

a. Long-range receiver module.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DEPLOYMENT OF CREDENTIALS

A. Comply with manufacturer's published instructions.

B. Third-Party Issuing of Access Control Credentials:

1. Printing of New Credentials: Contractor must be capable of programming and issuing credentials compatible with City of New York's access control system.

a. Initial Issuance: Provide spreadsheet or form for collecting data for generation of credentials. The Commissioner will submit completed form containing data for personnel to be issued credentials. Print and provide initial run, printed and programmed credentials in specified format within four weeks of request.
b. Ongoing Issuance: Produce additional credentials upon The Commissioner's request. The Commissioner will submit completed form containing data for personnel to be issued credentials. Print and program credentials in specified format within one weeks of request.

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Cable Type: Shielded.
2. Analog Maximum Cable Length: 1000 ft.
3. Digital Maximum Cable Length: 300 ft.

C. Interfaces with Other Work:

1. Coordinate installation of new products for access control hardware devices with existing conditions.
2. Coordinate access control credentials with integrated credential readers and access control system architecture.
3. Egress Management Interfaces:

a. Coordinate with Section 230923 "Direct Digital Control (DDC) System for HVAC" for monitoring of egress management device alarms by BMS.

b. Coordinate with Section 282000 "Video Surveillance" for automatic video feed callup upon delayed egress activation.
c. Coordinate with Section 284621.11 "Addressable Fire-Alarm Systems" for monitoring of egress management device alarms by fire-alarm system.

3.4 PROTECTION

A. After installation, protect integrated access control hardware devices from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the Commissioner.

3.5 GUARANTY SERVICE

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software and firmware support for oneyear.

2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within one year from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.

    a. Upgrade Notice: No fewer than 30 days to allow City of New York to schedule and access the system and to upgrade computer equipment if necessary.

3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION 281500

SECTION 281511 - INTEGRATED CREDENTIAL READERS AND ENTRY MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Credential readers.

B. Related Requirements:

1. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
2. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.5 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that integrated credential readers and entry management devices perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Initial Warranty Period: One year from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Proximity Reader for Card, Fob, or Smartphone :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AMAG Technology; G4S USA.
    b. aptiQ; an Allegion brand.
    c. HID Global; ASSA ABLOY.
    d. Or approved equal.

2. Source Limitations: Obtain products from single manufacturer.
3. Options:

    a. Enclosure Rating: IEC 60529, .
    b. Input Voltage: 5 to 16 V(dc).
    c. Operating Temperature: Minus 40 to plus 160 deg F.
    d. Read Range: Up to 1 inch.
    e. Transmit Frequency: 125 kHz 13.56 MHz 2.4 GHz.
    f. Materials: Long-wearing polymeric plastic.
    g. Colors: Black.
    h. Climate: Indoor.
    i. Size: Single gang.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Cable Type: Shielded.
2. Maximum Cable Length: 300 ft.

C. Interfaces with Other Work:

1. Coordinate installation of new products for integrated credential readers and entry management devices with existing conditions.

3.3 PROTECTION

A. After installation, protect integrated credential readers and entry management devices from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

3.4 GUARANTY SERVICE

A. Firmware Service :

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software and firmware support for one year.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within one year from date of Substantial Completion.

    a. Upgrade Notice: No fewer than 30 days to allow City of New York to schedule and access the system.

3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION 281511

SECTION 281513 - ACCESS CONTROL CREDENTIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Access control cards.

B. Related Requirements:

1. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
2. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 ACCESS CONTROL CARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cansec Systems Ltd.

2. HID Global; ASSA ABLOY.
3. Honeywell Commercial Security; Honeywell International, Inc.
4. or approved equal

B. Performance Criteria:

1. General Characteristics:

a. Reference Standards:

1) Physical: IEC 7810; IEC 10373; IEC 7816 for contact cards; and IEC 14443 for contactless cards.
2) Functional: UL 294; IEC 60839-11-1; and IEC 60839-11-2.
3) Material Durability: INCITS 322.

C. Options:

1. Data Format: Wiegand 37 bit.
2. Transmit Frequency: 125 kHz and 13.56 MHz.
3. Data Retention: 10 years.
4. Memory Capacity: 32 kB.
5. Operating Temperature: Minus 40 to plus 185 deg F.
6. Color: White.
7. Reading Medium: Proximity.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DEPLOYMENT

A. Comply with manufacturer's published instructions.

B. Third-Party Issuing of Access Control Credentials:

1. Printing of New Credentials: Contractor must be capable of programming and issuing credentials compatible with City of New York access control system.

a. Initial Issuance: Provide spreadsheet or form for collecting data for generation of credentials. The Commissioner will submit completed form containing data for personnel to be issued credentials. Print and provide initial run, printed and programmed credentials in specified format within four weeks of request.
b. Ongoing Issuance: Produce additional credentials upon The Commissioner's request. The Commissioner will submit completed form containing data for personnel to be issued credentials. Print and program credentials in specified format within two weeks of request.

C. Interfaces with Other Work:

1. Coordinate access control credentials with integrated credential readers and access control system architecture.

END OF SECTION 281513

SECTION 281519 - ACCESS CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Near Field Communications (NFC) access control devices.
2. Bluetooth communications access control devices.

B. Related Requirements:

1. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. NFC: Near Field Communications.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. NFC access control devices.
2. Bluetooth communications access control devices.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 NEAR FIELD COMMUNICATIONS (NFC) ACCESS CONTROL DEVICES

A. Description: This category includes access control devices that use NFC technology to transmit data over short distances. Data may be transmitted between proximity card, fob, or smartphone and NFC-enabled credential readers.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AMAG Technology; G4S USA.
2. aptiQ; an Allegion brand.
3. HID Global; ASSA ABLOY.
4. Or approved equal.

C. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN ALVY; including UL 294.

D. Options:

1. Enclosure Rating: IEC 60529, IP65.
2. Input Voltage: 5 to 12 V(dc).
3. Operating Temperature: Minus 40 to plus 160 deg F.
4. Read Range: Up to 1 inch.
5. Transmit Frequency: 125 kHz 13.56 MHz.
6. Materials: Long-wearing polymeric plastic.
7. Colors: Black.
8. Climate: Indoor.
9. Size: Single gang.

2.2 BLUETOOTH COMMUNICATIONS ACCESS CONTROL DEVICES

A. Description: This category includes access control devices that use Bluetooth communications to transmit data over short distances. Data are typically transmitted between smartphone and Bluetooth-enabled credential readers.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AMAG Technology; G4S USA.
2. HID Global; ASSA ABLOY.
3. Schlage; an Allegion brand.
4. Or approved equal.

C. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN ALVY; including UL 294.

D. Options:

1. Enclosure Rating: IEC 60529, IP65.
2. Input Voltage: 5 to 12 V(dc).
3. Operating Temperature: Minus 40 to plus 160 deg F.
4. Read Range: Up to 3 inch.
5. Transmit Frequency: 2.4 GHz.
6. Materials: Long-wearing polymeric plastic.
7. Colors: Black.
8. Climate: Indoor.
9. Size: Single gang.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Cable Type: Shielded.
2. Maximum Cable Length: 500 ft.

C. Interfaces with Other Work:

1. Coordinate installation of new products for with existing conditions.

3.3 PROTECTION

A. After installation, protect access control remote devices from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 281519

SECTION 281523 - INTERCOM ENTRY SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Digital audio-video intercom entry systems.

B. Related Requirements:

1. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
2. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.5 WARRANTY

A. Special Installer Warranty: Installer warrants that fabricated and installed intercom entry system perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within warranty period.

1. Warranty Period: one year from date of Substantial Completion; full coverage for labor, materials, and equipment.

B. Special Manufacturer Warranty: Manufacturer warrants that intercom entry system perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 DIGITAL AUDIO-VIDEO INTERCOM ENTRY SYSTEMS

A. Description: This category covers digital audio-video intercom entry systems, together with controls and accessories for use with such operators, and similar devices.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aiphone Corporation.
2. Enterphone; a brand of Identiv, Inc.
3. Stentofon; a brand of Zenitel USA.
4. Or approved equal.

C. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN ALVY; including UL 294.

D. Options:

1. Operating Temperature: Minus 29 to plus 150 deg F.
2. Input Power: 18 to 24 V(dc).
3. Connectivity: Hardwired.
4. Minimum Ring Voltage: 25 V(ac rms).
5. Maximum Ring Voltage: 90 V(ac rms).
6. Speaker Volume: Approximately 70 dB maximum at 1 m.
7. Materials: Stainless steel.
8. Finishes: Brushed stainless steel.
9. Mounting: Devices must be wall mounted.
10. Video Camera:

    a. Display: 7 inch full-color.
    b. Camera Input Power: 6 to 22 V(dc).
    c. Camera Field of View: 80 degrees horizontal, 60 degrees vertical, and 100 degrees diagonal.
    d. Camera Tilt/Swivel Adjustment: Vertical plus-or-minus 20 degrees; horizontal plus-or-minus 30 degrees.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Hardwired System:

a. Cable Type: Shielded.
b. Maximum Line Loop Cable Length: 6300 ft.
c. Maximum Power-over-Ethernet Cable Length: 300 ft.

2. Wireless Systems:

a. Maintain compliance with City of New York's wireless standards specified in Division 27.

C. Interfaces with Other Work:

1. Coordinate installation of new products for intercom entry systems with existing conditions.
2. Coordinate with Division 27 for wireless network provisioning of wireless intercom entry systems.

3.3 SYSTEM STARTUP

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.

3.4 PROTECTION

A. After installation, protect intercom entry system from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 281523

SECTION 282000 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment.

B. Related Requirements:

1. Section 281300 "Access Control System Software and Database Management" to integrate access control system interface and control.
2. Section 283100 "Intrusion Detection" to integrate video surveillance used for intrusion detection.
3. Section 283121 "Area and Perimeter Intrusion Detection" to integrate video surveillance used for intrusion detection.

1.3 DEFINITIONS

A. AGC: Automatic gain control.

B. BNC: Bayonet Neill-Concelman - type of connector.

C. B/W: Black and white.

D. CCD: Charge-coupled device.

E. FTP: File transfer protocol.

F. IP: Internet protocol.

G. LAN: Local area network.

H. MPEG: Moving picture experts group.

I. NTSC: National Television System Committee.

J. PC: Personal computer.

K. PTZ: Pan-tilt-zoom.

L. RAID: Redundant array of independent disks.

M. TCP: Transmission control protocol - connects hosts on the Internet.

N. UPS: Uninterruptible power supply.

O. WAN: Wide area network.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
4. UPS: Sizing calculations.
5. Wiring Diagrams: For power, signal, and control wiring.

C. Design Data: Include an equipment list consisting of every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.

2. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
3. Interior, Uncontrolled Environment: System components installed in non-air-conditioned interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.
4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use NEMA 250, Type 3 enclosures.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
6. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use NEMA 250, Type 4X enclosures.
7. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: one years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. Video-signal format shall comply with NTSC standard, composite interlaced video. Composite video-signal termination shall be 75 ohms.

B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NECA 1.

D. Comply with NFPA 70.

E. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

2.3 STANDARD CAMERAS

A. Manufacturers: Sole Source Manufacturer: Axis

1. No Substitutions Permitted.

2.4 NETWORK VIDEO RECORDERS

A. Sole Source Product: Genetec VMS, Current Version 5.4

1. No Substitutions Permitted.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.

B. Examine roughing-in for LAN, WAN, and IP network before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 WIRING

A. Wiring Method: Install cables in raceways unless otherwise indicated.

1. Except raceways are not required in accessible indoor ceiling spaces and attics.
2. Except raceways are not required in hollow gypsum board partitions.
3. Conceal raceways and wiring except in unfinished spaces.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

C. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.4 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Install cameras and infrared illuminators level and plumb.

B. Install cameras with 84-inch- minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

C. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.

D. Install power supplies and other auxiliary components at control stations unless otherwise indicated.

E. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.

F. Avoid ground loops by making ground connections only at the control station.

1. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.

G. Identify system components, wiring, cabling, and terminals according to Section 270553 "Identification for Communications Systems."

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:

1. Check cable connections.
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
3. Adjust all preset positions; consult City of New York's personnel.
4. Recommend changes to cameras, lenses, and associated equipment to improve City of New York's use of video surveillance system.
5. Provide a written report of adjustments and recommendations.

3.6 CLEANING

A. Clean installed items using methods and materials recommended in writing by manufacturer.

B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

END OF SECTION 282000

SECTION 283100 - INTRUSION DETECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Intrusion detection with communication links to perform monitoring, alarm, and control functions.
2. Integration of other electronic and electrical systems and equipment.

1.3 DEFINITIONS

A. CCTV: Closed-circuit television.

B. PIR: Passive infrared.

C. RFI: Radio-frequency interference.

D. UPS: Uninterruptible power supply.

E. Control Unit: System component that monitors inputs and controls outputs through various circuits.

F. Master Control Unit: System component that accepts inputs from other control units and may also perform control-unit functions. The unit has limited capacity for the number of protected zones and is installed at an unattended location or at a location where it is not the attendant's primary function to monitor the security system.

G. Monitoring Station: Facility that receives signals and has personnel in attendance at all times to respond to signals. A central station is a monitoring station that is listed.

H. Protected Zone: A protected premises or an area within a protected premises that is provided with means to prevent an unwanted event.

I. Standard Intruder: A person who weighs 100 lb or less and whose height is 60 inches or less; dressed in a long-sleeved shirt, slacks, and shoes.

J. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.

K. Systems Integration: The bringing together of components of several systems containing interacting components to achieve indicated functional operation of combined systems.

L. Zone. A defined area within a protected premises. It is a space or area for which an intrusion must be detected and uniquely identified. The sensor or group of sensors must then be assigned to perform the detection, and any interface equipment between sensors and communication must link to master control unit.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Altitude: Sea level to 4000 feet.
2. Master Control Unit: Rated for continuous operation in an ambient of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
3. Interior, Controlled Environment: System components, except master control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambients of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambients of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Comply with UL 294 and UL 639 for outdoor-use equipment. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings shall be rated, listed, and installed according to NFPA 70.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENT REQUIREMENTS

A. Control Units, Devices, and Communications with Monitoring Station: Listed and labeled by a qualified testing agency for compliance with SIA CP-01.

B. FM Global Compliance: FM-Approved and -labeled intrusion detection devices and equipment.

C. Comply with NFPA 70.

D. Compatibility: Detection devices and their communication features, connecting wiring, and master control unit shall be selected and configured with accessories for full compatibility with the following equipment:

1. Door hardware specified in Section 087100 "Door Hardware."
2. Access control system specified in Section 281300 "Access Control System Software and Database Management."
3. Video surveillance system specified in Section 282000 "Video Surveillance."

E. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Listed and labeled by a qualified testing agency for compliance with NFPA 731.

F. Intrusion Detection Units: Listed and labeled by a qualified testing agency for compliance with UL 639.

G. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V rms injected into power supply lines at 10 to 10,000 MHz.

H. Tamper Protection: Tamper switches on detection devices, control units, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Master control-unit alarm display shall identify tamper alarms and indicate locations.

I. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to master control unit.

J. Antimasking Devices: Automatically check operation continuously or at intervals of a minute or less, and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Devices transmit detection of operational dysfunction to master control unit as an alarm signal.

K. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to master control unit.

L. Remote-Controlled Devices: Individually and remotely adjustable for sensitivity and individually monitored at master control unit for calibration, sensitivity, and alarm condition.

2.2 DOOR AND WINDOW SWITCHES

A. Product: Subject to compliance with requirements, provide one of the following:

1. GE Security, Inc.
2. George Risk Industries.
3. Honeywell International Inc.
4. Or approved equal.

B. Description: Balanced-magnetic switch, complying with UL 634, installed on frame with integral overcurrent device to limit current to 80 percent of switch capacity. Bias magnet and minimum of two encapsulated reed switches shall resist compromise from introduction of foreign magnetic fields.

C. Flush-Mounted Switches: Unobtrusive and flush with surface of door and window frame.

D. Overhead Door Switch: Balanced-magnetic type, listed for outdoor locations, and having door-mounted magnet and floor-mounted switch unit.

E. Remote Test: Simulate movement of actuating magnet from master control unit.

2.3 PIR SENSORS

A. Product: Subject to compliance with requirements, provide one of the following:

1. Bosch Security Systems, Inc.
2. GE Security, Inc.
3. Honeywell International Inc.
4. Or approved equal.

B. Listed and labeled by a qualified testing agency for compliance with SIA PIR-01.

C. Description: Sensors detect intrusion by monitoring infrared wavelengths emitted from a human body within their protected zone and by being insensitive to general thermal variations.

1. Wall-Mounted Unit Maximum Detection Range: 125 percent of indicated distance for individual units and not less than 50 feet. Provide adjustable coverage pattern as indicated.

2.4 DURESS-ALARM SWITCHES

A. Product: Subject to compliance with requirements, provide one of the following:

1. GE Security, Inc.
2. Honeywell International Inc.
3. United Security Products
4. Or approved equal.

2.5 MASTER CONTROL UNIT

A. Product: Subject to compliance with requirements, provide one of the following:

1. Bosch Security Systems, Inc.
2. GE Security, Inc.
3. Honeywell International Inc.
4. Honeywell Security Products- Americas.
5. Or approved equal.

B. Description: Supervise sensors and detection subsystems and their connecting communication links, status control (secure or access) of sensors and detector subsystems, activation of alarms and supervisory and trouble signals, and other indicated functions.

1. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
2. Include a real-time clock for time annotation of events on the event recorder and printer.
3. Addressable initiation devices that communicate device identity and status.
4. Control circuits for operation of mechanical equipment in response to an alarm.

C. Comply with UL 609.

D. Console Controls and Displays: Arranged for interface between human operator at master control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: LCD, three line(s) of 80 characters, minimum.
2. Operator Controls: Manual switches and push-to-test buttons that do not require a key to operate. Prevent resetting of alarm, supervisory, or trouble signals while alarm or trouble condition persists. Include the following:

    a. Silence alarm.
    b. System reset.
    c. LED test.

3. Timing Unit: Solid state, programmable, 365 days.
4. Alarm Indication: Audible signal sounds and an LED lights at master control unit identifying the protected zone originating the alarm. Annunciator panel displays a common alarm light and sounds an audible tone.
5. Alarm activation sounds a siren.

E. Protected Zones: Quantity of alarm and supervisory zones as indicated, with capacity for expanding number of protected zones by a minimum of 25 percent.

F. Power Supply Circuits: Master control units shall provide power for remote power-consuming detection devices. Circuit capacity shall be adequate for at least a 25 percent increase in load.

G. Cabinet: Lockable, steel enclosure arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch high. Identify, with permanent labels, individual components and modules within cabinets.

H. Transmission to Monitoring Station: A communications device to automatically transmit alarm, supervisory, and trouble signals to the monitoring station, operating over a standard voice grade telephone leased line. Comply with UL 1635.

I. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

2.6 AUDIBLE AND VISUAL ALARM DEVICES

A. Product: Subject to compliance with requirements, provide one of the following:

1. Alarm Controls Corporation.
2. Edwards Signaling; UTC Fire & Security.
3. Honeywell International Inc.
4. Or approved equal.

B. Bell: 10 inches in diameter, rated to produce a minimum sound output of 84 dB at 10 feet from master control unit.

1. Enclosure: Weather-resistant steel box equipped with tamper switches on cover and on back of box.

C. Siren: 30-W speaker with siren driver, rated to produce a minimum sound output of 103 dB at 10 feet from master control unit.

1. Enclosure: Weather-resistant steel box with tamper switches on cover and on back of box.

D. Strobe: Xenon light complying with UL 1638, with a clear polycarbonate lens.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of intrusion detection.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.

D. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.
2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

E. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SYSTEM INTEGRATION

A. Integrate intrusion detection system with the following systems and equipment:

1. Electronic door hardware.
2. Elevators.
3. Network lighting controls.
4. Intercommunications and program systems.
5. Public address and mass notification systems.
6. Access control.
7. Fire-alarm system.
8. Perimeter security system.
9. Video surveillance.

3.4 SYSTEM INSTALLATION

A. Comply with UL 681 and NFPA 731.

B. Equipment Mounting: Install master control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.

C. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

D. Connecting to Existing Equipment: Verify that existing perimeter security system is operational before making changes or connections.

1. Connect new equipment to existing control panel in existing part of the building.
2. Connect new equipment to existing monitoring equipment at the Supervising Station.

E. Security Fasteners: Where accessible to inmates, install intrusion detection components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools shall be required to operate security fasteners for Project.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with identification requirements in Section 270553 "Identification for Communications Systems."

B. Install instructions frame in a location visible from master control unit.

3.6 GROUNDING

A. Ground the master control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to master control unit.

B. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Section 270526 "Grounding and Bonding for Communications Systems."

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections: Comply with provisions in NFPA 731, Ch. 9, "Testing and Inspections."

1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
2. Test Methods: Intrusion detection systems and other systems and equipment that are associated with detection and accessory equipment shall be tested according to Table "Test Methods" and Table "Test Methods of Initiating Devices."

E. Documentation: Comply with provisions in NFPA 731, Ch. 4, "Documentation."

F. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

3.8 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate the intrusion detection system. Comply with documentation provisions in NFPA 731, Ch. 4, "Documentation and User Instruction."

END OF SECTION 283100

SECTION 283121 - AREA AND PERIMETER INTRUSION DETECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Perimeter detection and alarm system.
2. Integration of other electronic and electrical systems and equipment.

1.3 DEFINITIONS

A. CCTV: Closed-circuit television.

B. EMI: Electromagnetic interference.

C. PIR: Passive infrared.

D. RFI: Radio-frequency interference.

E. UPS: Uninterruptible power supply.

F. Control Unit: System component that monitors inputs and controls outputs through various circuits.

G. Master Control Unit: System component that accepts inputs from other control units and may also perform control-unit functions. The unit has limited capacity for the number of protected zones and is installed at an unattended location or at a location where it is not the attendant's primary function to monitor the security system.

H. Monitoring Station: Facility that receives signals and has personnel in attendance at all times to respond to signals. A central station is a monitoring station that is listed.

I. Protected Zone: A protected premises or an area within a protected premise that is provided with means to prevent an unwanted event.

J. Standard Intruder: A person who weighs 100 lb or less and whose height is 60 inches or less; dressed in a long-sleeved shirt, slacks, and shoes.

K. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.

L. Systems Integration: The bringing together of components of several systems containing interacting components to achieve indicated functional operation of combined systems.

M. Zone. A defined area within a protected premise. It is a space or area for which an intrusion must be detected and uniquely identified. The sensor or group of sensors must then be assigned to perform the detection, and any interface equipment between sensors and communication must link to master control unit.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Altitude: Sea level to 4000 feet.
2. Master Control Unit: Rated for continuous operation in an ambient of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambients of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Comply with UL 294 and UL 639 for outdoor-use equipment. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph.
4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings shall be rated, listed, and installed according to NFPA 70.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of perimeter security devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SECURE AND ACCESS DEVICES

A. Sole Source Manufacturer: Honeywell International Inc.

1. No Substitutions Permitted.

B. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

2.2 LONG-RANGE PIR DETECTORS

A. Sole Source Manufacturer: Bosch Security System

1. No Substitutions Permitted.

B. Description: Volumetric passive infrared detection system.

C. Listed and labeled by a qualified testing agency for compliance with SIA PIR-01.

D. System Performance: Detect an interruption of dual-infrared light beams that link transmitters and receivers. Generate an alarm when signal is interrupted due to presence of an object that interrupts both beams.

1. Sensitivity: Field adjustable to allow adjustment of range from 25 to 500 feet, generating an alarm within 20 to 50 ms when both beams are interrupted.
2. Detection system shall adjust automatically to compensate for weather, including fog, rain, snow, blowing dust, and rapid temperature changes.
3. Motion Detection: Detect standard-intruder movement at rates from 0.1 to 50 fps.
4. Supervision: Generate supervisory alarm if any portion of system is tampered with.
5. Remote Test: When initiated by master control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.

2.3 AUDIBLE AND VISUAL ALARM DEVICES

A. Sole Source Product: Altronic

1. No Substitutions Permitted.

B. Siren: 30-W speaker with siren driver, rated to produce a minimum sound output of 103 dB at 10 feet from master control unit.

C. Enclosure: Weather-resistant steel box with tamper switches on cover and on back of box.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of perimeter security.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of perimeter security connections before perimeter security installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of perimeter security.

D. Inspect built-in and cast-in anchor installations, before installing perimeter security, to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.
2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

E. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SYSTEMS INTEGRATION

A. Integrate perimeter security system with the following systems and equipment:

1. Electronic door hardware.
2. Elevators.
3. Network lighting controls.
4. Intercommunications and program systems.
5. Public address and mass notification systems.
6. Access control.
7. Fire-alarm system.
8. Intrusion detection system.
9. Video surveillance.

3.4 SYSTEM INSTALLATION

A. Comply with UL 681 and NFPA 731.

B. Equipment Mounting: Install master control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.

C. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

D. Connecting to Existing Equipment: Verify that existing perimeter security system is operational before making changes or connections.

1. Connect new equipment to existing control panel in existing part of the building.
2. Connect new equipment to existing monitoring equipment at the Supervising Station.
3. Expand, modify, and supplement existing control equipment as necessary to extend existing control functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

E. Wiring Method: Install power, signal, and data transmission wire and cable in metal raceways.Minimum conduit size shall be 1/2 inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

F. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with perimeter security system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

G. Wires and Cables:

1. Conductors: Size as recommended in writing by system manufacturer unless otherwise indicated.
2. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.
3. Cable for Low-Voltage Control and Signal Circuits: Install unshielded, twisted-pair cable unless otherwise indicated or if manufacturer recommends shielded cable, according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
4. Data and Television Signal Transmission Cables: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

H. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

I. Install power supplies and other auxiliary components for detection devices at control units unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with identification requirements in Section 270553 "Identification for Communications Systems."

B. Install instructions frame in a location visible from master control unit.

3.6 GROUNDING

A. Ground the master control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to master control unit.

B. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5 -ohm ground. Measure, record, and report ground resistance.

D. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Section 270526 "Grounding and Bonding for Communications Systems."

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose. Visits for this purpose shall be in addition to any required by warranty.

END OF SECTION 283121

SECTION 284621.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Existing fire-alarm system to be modified.
2. Addressable fire-alarm system.
3. Fire-alarm control unit (FACU).
4. Manual fire-alarm boxes.
5. System smoke detectors.
6. Duct smoke detectors.
7. Carbon monoxide detectors.
8. Heat detectors.
9. Multicriteria and multisensor fire detectors.
10. Fire-alarm notification appliances.
11. Post fire smoke purge system.
12. Fire-alarm remote annunciators.
13. Fire-alarm addressable interface devices.
14. Digital alarm communicator transmitters (DACTs).

1.3 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. EMT: Electrical metallic tubing.

C. FACU: Fire-alarm control unit.

D. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.

E. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the 2007 Energy Independence and Security Act (EISA).

F. PC: Personal computer.

G. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

1.4 SEQUENCING AND SCHEDULING

A. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

1.6 ACTION SUBMITTALS

A. Approved Permit Submittal: Submittals must be approved by the NYC Department of Buildings prior to submitting them to Commissioner.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in "Documentation" section of "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, and details, including details of attachments to other Work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Annunciator panel details.
5. Detail assembly and support requirements.
6. Include voltage drop calculations for notification-appliance circuits.
7. Include battery-size calculations.
8. Include input/output matrix.
9. Include written statement from manufacturer that equipment and components have been tested as a system and comply with requirements in this Section and in NFPA 72.
10. Include performance parameters and installation details for each detector.
11. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

12. Provide program report showing that air-sampling detector pipe layout balances pneumatically within airflow range of air-sampling detector.
13. Provide control wiring diagrams for fire-alarm interface to HVAC; coordinate location of duct smoke detectors and access to them.

    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by post fire smoke purge system.
    c. Locate detectors in accordance with manufacturer's written instructions.
    d. Show air-sampling detector pipe routing.

14. Include alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
15. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

D. Engineering Services Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the New York State licensed professional engineer responsible for their preparation.

1. Drawings showing location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of device.
2. Design Calculations: Calculate requirements for selecting spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.7 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Seismic Performance Certificates: For FACU, accessories, and components, from manufacturer. Include the following information:

    a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
    c. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.

B. Field quality-control reports.

C. Qualification Statements: For Installer.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition closeout requirements as required by DDC General Conditions, include the following and deliver copies to the NYC Department of Buildings:

a. Comply with "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire-Alarm and Emergency Communications System Record of Completion Documents" in accordance with "Completion Documents" Article in "Documentation" section of "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between devices and equipment. Each conductor must be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
g. Record copy of site-specific software.
h. Provide "Inspection and Testing Form" in accordance with "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

i. Manufacturer's required maintenance related to system warranty requirements.
j. Abbreviated operating instructions for mounting at FACU and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On USB media and approved online or cloud solution.
3. Device address list.
4. Printout of software application and graphic screens.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Installer's personnel must be trained and certified by manufacturer for installation of units required for this Project.

1.10 FIELD CONDITIONS

A. Seismic Conditions: Unless otherwise indicated on Contract Documents, specified Work in this Section must withstand the seismic hazard design loads determined in accordance with ASCE/SEI 7 for installed elevation above or below grade.

1. The term "withstand" means "unit must remain in place without separation of parts from unit when subjected to specified seismic design loads and unit must be fully operational after seismic event."

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ADDRESSABLE FIRE-ALARM SYSTEM

A. Description:

1. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn-and-strobe notification for evacuation.

B. Performance Criteria:

1. Regulatory Requirements:

a. Fire-Alarm Components, Devices, and Accessories: Listed and labeled by a NRTL in accordance with NFPA 70 for use with selected fire-alarm system and marked for intended location and application.

2. General Characteristics:

a. Automatic sensitivity control of certain smoke detectors.
b. Fire-alarm signal initiation must be by one or more of the following devices and systems:

1) Manual stations.
2) Heat detectors.
3) Flame detectors.
4) Smoke detectors.
5) Duct smoke detectors.
6) Air-sampling smoke-detection system.
7) Carbon monoxide detectors.
8) Combustible gas detectors.

9) Automatic sprinkler system water flow.
10) Preaction system.
11) Fire-extinguishing system operation.
12) Fire standpipe system.
13) Dry system pressure flow switch.
14) Fire pump running.

c. Fire-alarm signal must initiate the following actions:

1) Continuously operate alarm notification appliances.
2) Identify alarm and specific initiating device at FACU, connected network control panels, off-premises network control panels, and remote annunciators.
3) Transmit alarm signal to remote alarm receiving station.
4) Unlock electric door locks in designated egress paths.
5) Release fire and smoke doors held open by magnetic door holders.
6) Activate voice/alarm communication system.
7) Switch HVAC equipment controls to fire-alarm mode.
8) Activate stairwell and elevator-shaft ventilation.
9) Close smoke dampers in air ducts of designated air-conditioning duct systems.
10) Recall elevators to primary or alternate recall floors.
11) Activate elevator power shunt trip.
12) Activate emergency lighting control.
13) Activate emergency shutoffs for gas and fuel supplies, except for shutoffs serving legally required life-safety systems.
14) Record events in system memory.
15) Record events by system printer.
16) Indicate device in alarm on graphic annunciator.

d. Supervisory signal initiation must be by one or more of the following devices and actions:

1) Valve supervisory switch.
2) High- or low-air-pressure switch of dry-pipe or preaction sprinkler system.
3) Alert and Action signals of air-sampling detector system.
4) Elevator shunt-trip supervision.
5) Independent fire-detection and -suppression systems.
6) Fire pump is running.
7) Fire pump has lost power.
8) Power to fire pump has phase reversal.
9) Zones or individual devices have been disabled.
10) FACU has lost communication with network.

e. System trouble signal initiation must be by one or more of the following devices and actions:

1) Open circuits, shorts, and grounds in designated circuits.
2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3) Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4) Loss of primary power at FACU.

5) Ground or single break in internal circuits of FACU.
6) Abnormal ac voltage at FACU.
7) Break in standby battery circuitry.
8) Failure of battery charging.
9) Abnormal position of switch at FACU or annunciator.
10) Alarm signal amplifier failure.
11) Hose cabinet door open.

f. System Supervisory Signal Actions:

1) Initiate notification appliances.
2) Identify specific device initiating event at FACU, connected network control panels, off-premises network control panels, and remote annunciators.
3) Record event on system printer.
4) After time delay of 200 seconds, transmit trouble or supervisory signal to remote alarm receiving station.
5) Transmit system status to building management system.

g. Network Communications:

1) Provide network communications for fire-alarm system in accordance with fire-alarm manufacturer's written instructions.
2) Provide network communications pathway per manufacturer's written instructions and requirements in NFPA 72 and NFPA 70.
3) Provide integration gateway using BACnet for connection to building automation system.

h. System Printer:

1) Printer must be listed and labeled as integral part of fire-alarm system.

i. Device Guards:

1) Description: Welded wire mesh of size and shape for manual station, smoke detector, gong, or other device requiring protection.

a) Factory fabricated and furnished by device manufacturer.
b) Finish: Paint of color to match protected device.

j. Document Storage Box:

1) Description: Enclosure to accommodate standard 8-1/2-by-11 inch manuals and loose document records. Legend sheet will be permanently attached to door for system required documentation, key contacts, and system information. Provide two key ring holders with location to mount standard business cards for key contact personnel.
2) Material and Finish: 18-gauge cold-rolled steel; four mounting holes.
3) Color: Red powder-coat epoxy finish.
4) Labeling: Permanently screened with 1 inch high lettering "SYSTEM RECORD DOCUMENTS" with white indelible ink.

5) Security: Locked with 3/4 inch barrel lock. Provide solid 12 inch stainless steel piano hinge.

2.2 FIRE-ALARM CONTROL UNIT (FACU)

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards EST 4)

1. No Substitutions Permitted.

B. Description: Field-programmable, microprocessor-based, modular, power-limited design with electronic modules.

C. Performance Criteria:

1. Regulatory Requirements: Comply with NFPA 72 and UL 864.
2. General Characteristics:

a. System software and programs must be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining information through failure of primary and secondary power supplies.
b. Include real-time clock for time annotation of events on event recorder and printer.
c. Provide communication between FACU and remote circuit interface panels, annunciators, and displays.
d. FACU must be listed for connection to central-station signaling system service.
e. Provide nonvolatile memory for system database, logic, and operating system and event history. System must require no manual input to initialize in the event of complete power down condition. FACU must provide minimum 500-event history log.
f. Addressable Initiation Device Circuits: FACU must indicate which communication zones have been silenced and must provide selective silencing of alarm notification appliance by building communication zone.

1) Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: FACU must be listed for releasing service.

g. Fire-Alarm Annunciator: Arranged for interface between human operator at FACU and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and programming and control menu.

1) Annunciator and Display: LCD, 80 characters, minimum.
2) Keypad: Arranged to permit entry and execution of programming, display, and control commands.

h. Alphanumeric Display and System Controls: Arranged for interface between human operator at FACU and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and programming and control menu.

1) Annunciator and Display: LCD, three line(s) of 80 characters, minimum.

2) Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into system for control of smoke-detector sensitivity and other parameters.

i. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1) Pathway Class Designations: NFPA 72, Class A .
2) Pathway Survivability: Level 0 .
3) Install no more than 50 addressable devices on each signaling-line circuit.
4) Install fault circuit isolators to comply with circuit performance requirements of NFPA 72 or with manufacturer's written instructions, whichever is more conservative.

j. Stairwell and Elevator Shaft Ventilation: Provide output signal using addressable relay to start stairwell and elevator shaft ventilation. Signal must remain on until alarm conditions are cleared and fire-alarm system is reset. Signal must not stop in response to alarm acknowledge or signal silence commands.

1) Pressurization starts when alarm is received at FACU.
2) Alarm signals from smoke detectors at pressurization air supplies have higher priority than other alarm signals that start system.

k. Elevator controller must be programmed to move cars to alternate recall floor if lobby detectors located on designated recall floors are activated.

l. Water-flow alarm connected to sprinkler in elevator shaft and elevator machine room must shut down elevators associated with location without time delay.

1) Water-flow switch associated with sprinkler in elevator pit may have delay to allow elevators to move to designated floor.

m. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls must be connected to fire-alarm system.

n. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to remote alarm station.

o. Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as special module that is part of FACU.

p. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of central-control microphone. Amplifiers must comply with UL 1711.

1) Allow application of, and evacuation signal to, indicated number of zones and simultaneously allow alarm to other zones selectively or in combination.
2) Programmable tone and message sequence selection.
3) Standard digitally recorded messages for "Evacuation" and "All Clear."
4) Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of FACU.

q. Status Annunciator: Indicate status of various voice/alarm speaker zones and status of firefighters' two-way telephone communication zones.

r. Preamplifiers, amplifiers, and tone generators must automatically transfer to backup units, on primary equipment failure.
s. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from other printed indications. Also, print system reset event, including same information for device, location, date, and time. Commands initiate printing of list of existing alarm, supervisory, and trouble conditions in system and historical log of events.
t. Primary Power: 24 V(dc) obtained from 120 V(ac) service and power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and DACT must be powered by 24 V(dc) source.
u. Alarm current draw of entire fire-alarm system must not exceed 80 percent of power-supply module rating.
v. Secondary Power: 24 V(dc) supply system with batteries, automatic battery charger, and automatic transfer switch.
w. Batteries: Sealed lead calcium.

D. Accessories:

1. Instructions: Computer printout or typewritten instruction card mounted behind plastic or glass cover in stainless steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe functional operation of system under normal, alarm, and trouble conditions.
2. Preaction System Functionality:

a. Initiate Presignal Alarm: This function must cause audible and visual alarm and indication to be provided at FACU. Activation of initiation device connected as part of preaction system must be annunciated at FACU only, without activation of general evacuation alarm.

2.3 MANUAL FIRE-ALARM BOXES

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

1. No Substitutions Permitted.

B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes must be finished in red with molded, raised-letter operating instructions in contrasting color; must show visible indication of operation; and must be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to FACU.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at top to permit lifting for access to initiate alarm. Lifting cover actuates integral battery-powered audible horn intended to discourage false-alarm operation.

4. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at top to permit lifting for access to initiate alarm.
5. Able to perform at up to 90 percent relative humidity at 90 deg F.
6. Material: Manual stations made of Lexan polycarbonate.
7. Able to be used in indoor areas.

2.4 SYSTEM SMOKE DETECTORS

A. Photoelectric Smoke Detectors:

1. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

    a. No Substitutions Permitted.

2. Performance Criteria:

    a. Regulatory Requirements:

        1) NFPA 72.
        2) UL 268.

    b. General Characteristics:

        1) Detectors must be four -wire type.
        2) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
        3) Base Mounting: Detector and associated electronic components must be mounted in twist-lock module that connects to fixed base. Provide terminals in fixed base for connection to building wiring.
        4) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
        5) Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
        6) Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
        7) Operator at FACU, having designated access level, must be able to manually access the following for each detector:

            a) Primary status.
            b) Device type.
            c) Present average value.
            d) Present sensitivity selected.
            e) Sensor range (normal, dirty, etc.).

        8) Detector must have functional humidity range within 10 to 90 percent relative humidity.
        9) Color: White.

10) Remote Control: Unless otherwise indicated, detectors must be digital-addressable type, individually monitored at FACU for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by FACU.
11) Rate-of-rise temperature characteristic of combination smoke- and heat-detection units must be selectable at FACU for 15 or 20 deg F per minute.
12) Fixed-temperature sensing characteristic of combination smoke- and heat-detection units must be independent of rate-of-rise sensing and must be settable at FACU to operate at 135 or 155 deg F.
13) Multiple levels of detection sensitivity for each sensor.
14) Sensitivity levels based on time of day.

B. Ionization Smoke Detectors:

1. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

a. No Substitutions Permitted.

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 268.

b. General Characteristics:

1) Detectors must be four -wire type.
2) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
3) Base Mounting: Detector and associated electronic components must be mounted in twist-lock module that connects to fixed base. Provide terminals in fixed base for connection to building wiring.
4) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5) Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
6) Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
7) Operator at FACU, having designated access level, must be able to manually access the following for each detector:

a) Primary status.
b) Device type.
c) Present average value.
d) Present sensitivity selected.
e) Sensor range (normal, dirty, etc.).

8) Detector must have functional humidity range within 10 to 90 percent relative humidity.
9) Color: White.

10) Remote Control: Unless otherwise indicated, detectors must be digital-addressable type, individually monitored at FACU for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by FACU.
11) Rate-of-rise temperature characteristic of combination smoke- and heat-detection units must be selectable at FACU for 15 or 20 deg F per minute.
12) Fixed-temperature sensing characteristic of combination smoke- and heat-detection units must be independent of rate-of-rise sensing and must be settable at FACU to operate at 135 or 155 deg F.
13) Multiple levels of detection sensitivity for each sensor.
14) Sensitivity levels based on time of day.

2.5 DUCT SMOKE DETECTORS

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

1. No Substitutions Permitted.

B. Description: Photoelectric-type, duct-mounted smoke detector.

C. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.
b. UL 268A.

2. General Characteristics:

a. Detectors must be four -wire type.
b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
c. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
d. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
e. Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
f. Operator at FACU, having designated access level, must be able to manually access the following for each detector:

1) Primary status.
2) Device type.
3) Present average value.
4) Present sensitivity selected.
5) Sensor range (normal, dirty, etc.).

g. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with supplied detector for smoke detection in HVAC system ducts.

h. Each sensor must have multiple levels of detection sensitivity.
i. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
j. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 CARBON MONOXIDE DETECTORS

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

1. No Substitutions Permitted.

B. Description: Carbon monoxide detector listed for connection to fire-alarm system.

C. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72
b. NFPA 720.
c. UL 2075.

2. General Characteristics:

a. Mounting: Adapter plate for outlet box mounting.
b. Testable by introducing test carbon monoxide into sensing cell.
c. Detector must provide alarm contacts and trouble contacts.
d. Detector must send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
e. Locate, mount, and wire in accordance with manufacturer's written instructions.
f. Provide means for addressable connection to fire-alarm system.
g. Test button simulates alarm condition.

2.7 HEAT DETECTORS

A. Combination-Type Heat Detectors:

1. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

a. No Substitutions Permitted.

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 521.

b. General Characteristics:

1) Temperature sensors must test for and communicate sensitivity range of device.
2) Actuated by fixed temperature of 135 deg F or rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
3) Mounting: Twist-lock base interchangeable with smoke-detector bases.
4) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
5) Detector must have functional humidity range of 10 to 90 percent relative humidity.

a) Color: White.

B. Fixed-Temperature-Type Heat Detectors:

1. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

a. No Substitutions Permitted.

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 521.

b. General Characteristics:

1) Actuated by temperature that exceeds fixed temperature of 190 deg F.
2) Mounting: Twist-lock base interchangeable with smoke-detector bases.
3) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
4) Detector must have functional humidity range of 10 to 90 percent.
5) Color: White.

2.8 MULTICRITERIA AND MULTISENSOR FIRE DETECTORS

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

1. No Substitutions Permitted.

B. Description: Fire-sensing detectors using multiple means of detection.

C. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Mounting: Twist-lock base interchangeable with smoke-detector bases.
b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
c. Automatically adjusts its sensitivity by means of drift compensation and smoothing algorithms. Detector must send trouble alarm if it is incapable of compensating for existing conditions.
d. Test button tests sensors in detector.
e. Operator at FACU, having designated access level, must be able to manually access the following for each detector:

1) Primary status.
2) Device type.
3) Present sensitivity selected.
4) Sensor range (normal, dirty, etc.).

f. Detector must have functional humidity range within 10 to 90 percent relative humidity.
g. Color: White.
h. Comply with UL requirements.
i. Sensors (Multisensor Type): Detector must be comprised of four sensing elements including smoke sensor, carbon monoxide sensor, infrared sensor, and heat sensor.

1) Smoke sensor must be photoelectric type as described in "System Smoke Detectors" Article.
2) Carbon monoxide sensor must be as described in "Carbon Monoxide Detectors" Article.
3) Heat sensor must be as described in "Heat Detectors" Article.
4) Each sensor must be separately listed in accordance with requirements for its detector type.

2.9 FIRE-ALARM NOTIFICATION APPLIANCES

A. Fire-Alarm Audible Notification Appliances:

1. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

a. No Substitutions Permitted.

2. Description: Horns, bells, or other notification devices that cannot output voice messages.
3. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.

b. General Characteristics:

1) Individually addressed, connected to signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
2) Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
3) Audible notification appliances must have functional humidity range of 10 to 95 percent relative humidity.
4) Horns: Electric-vibrating-polarized type, 24V(dc); with provision for housing operating mechanism behind grille. Comply with UL 464. Horns must produce sound-pressure level of 90 dB (A-weighted), measured 10 ft. from horn, using coded signal prescribed in UL 464 test protocol.
5) Combination Devices: Factory-integrated audible and visible devices in single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Fire-Alarm Voice/Tone Notification Appliances:

1. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

   a. No Substitutions Permitted.

2. Description: Notification appliances capable of outputting tones.
3. Performance Criteria:

   a. Regulatory Requirements:

      1) NFPA 72.
      2) UL 1480.

   b. General Characteristics:

      1) High-Range Units: Rated 2 to 15 W.
      2) Low-Range Units: Rated 1 to 2 W.
      3) Mounting: Flush semi-recessed surface mounted and bidirectional.
      4) Matching Transformers: Tap range matched to acoustical environment of speaker location.
      5) Combination Devices: Factory-integrated audible and visible devices in single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

C. Fire-Alarm Visible Notification Appliances:

1. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

   a. No Substitutions Permitted.

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 1971.

b. General Characteristics:

1) Rated Light Output:

a) As indicated in drawings cd.
b) 15/30/75/110 cd, selectable in field.

2) Clear or nominal white polycarbonate lens mounted on aluminum faceplate.
3) Mounting: Wall mounted unless otherwise indicated.
4) For units with guards to prevent physical damage, light output ratings must be determined with guards in place.
5) Flashing must be in temporal pattern, synchronized with other units.
6) Strobe Leads: Factory connected to screw terminals.
7) Mounting Faceplate: Factory finished, red white.

2.10 POST FIRE SMOKE PURGE SYSTEM

A. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Initiate Post Fire Smoke Purge Sequence of Operation:

1) Comply with sequence of operation as described in Section 230993.11 "Sequence of Operations for HVAC DDC" or on Drawings.
2) Fire-alarm system must provide interfaces and control points required to properly activate post fire smoke purge systems.
3) Post fire smoke purge system shall be operated via manual controls as part of the fire alarm control unit. City wide 2642 key shall be used to manually enable the system. A separate switch shall be used to operate the post fire smoke purge system for each floor (one floor at a time). Activation of such switch shall enable required smoke removal fan(s) and open the associated dampers to conduct smoke removal on that floor.
4) Subsequent devices going into alarm condition must have no effect on post fire smoke purge mode.

b. Addressable Relay Modules:

1) Provide address-setting means on module. Store internal identifying code for control panel use to identify module type.

2) Allow control panel to switch relay contacts on command.
3) Have minimum of two normally open and two normally closed contacts available for field wiring.
4) Listed for controlling HVAC fan motor controllers.
5) Provide start, stop and run status relay for each post fire smoke purge fan.

2.11 FIRE-ALARM REMOTE ANNUNCIATORS

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

1. No Substitutions Permitted.

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Annunciator functions must match those of FACU for alarm, supervisory, and trouble indications. Manual switching functions must match those of FACU, including acknowledging, silencing, resetting, and testing.

1) Mounting: Flush Surface cabinet, NEMA 250, Type 1.

b. Display Type and Functional Performance: Alphanumeric display and LED indicating lights must match those of FACU. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.12 FIRE-ALARM ADDRESSABLE INTERFACE DEVICES

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

1. No Substitutions Permitted.

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Include address-setting means on module.
b. Store internal identifying code for control panel use to identify module type.
c. Listed for controlling HVAC fan motor controllers.

d. Monitor Module: Microelectronic module providing system address for alarm-initiating devices for wired applications with normally open contacts.
e. Integral Relay: Capable of providing direct signal to elevator controller to initiate elevator recall.

1) Allow control panel to switch relay contacts on command.
2) Have minimum of two normally open and two normally closed contacts available for field wiring.

f. Control Module:

1) Operate notification devices.
2) Operate solenoids for use in sprinkler service.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTERS (DACTs)

A. Sole Source Manufacturer: United Technologies Corporation (UTC Climate, Controls & Security - Edwards)

1. No Substitutions Permitted.

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. DACT must be acceptable to remote central station and must be listed for fire-alarm use.
b. Functional Performance: Unit must receive alarm, supervisory, or trouble signal from FACU and automatically capture one telephone line(s) and dial preset number for remote central station. When contact is made with central station(s), signals must be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter must initiate local trouble signal and transmit signal indicating loss of telephone line to remote alarm receiving station over remaining line. Transmitter must automatically report telephone service restoration to central station. If service is lost on both telephone lines, transmitter must initiate local trouble signal.
c. Local functions and display at DACT must include the following:

1) Verification that both telephone lines are available.
2) Programming device.
3) LED display.
4) Manual test report function and manual transmission clear indication.
5) Communications failure with central station or FACU.

d. Digital data transmission must include the following:

1) Address of alarm-initiating device.
2) Address of supervisory signal.

3) Address of trouble-initiating device.
4) Loss of ac supply.
5) Loss of power.
6) Low battery.
7) Abnormal test signal.
8) Communication bus failure.

e. Secondary Power: Integral rechargeable battery and automatic charger.
f. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Preinstallation Testing: Perform verification of functionality of installed components of existing system prior to starting work. Document equipment or components not functioning as designed.

B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary guard service in accordance with requirements indicated:

1. Notify Commissioner no fewer than seven days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Commissioner's written permission.

C. Protection of In-Place Conditions: Protect devices during construction unless devices are placed in service to protect facility during construction.

3.4 INSTALLATION OF EQUIPMENT

A. Comply with NECA 305, NFPA 72, NFPA 101, and requirements the NYC Building Code for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before other trades have completed cleanup must be replaced.
2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.

B. Equipment Floor Mounting: Install FACU on concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18 inch centers around full perimeter of concrete base.
2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Equipment Floor and Wall Mounting: Install FACU on finished floor.

D. Install wall-mounted equipment, with tops of cabinets not more than 78 inch above finished floor.

E. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in normal path of egress within 60 inch of exit doorway.
2. Mount manual fire-alarm box on background of contrasting color.
3. Operable part of manual fire-alarm box must be between 42 and 48 inch above floor level. Devices must be mounted at same height unless otherwise indicated.

F. Smoke- and Heat-Detector Spacing:

1. Comply with "Smoke-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with "Heat-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing must not exceed 30 ft..
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined in accordance with Annex A in NFPA 72.
5. HVAC: Locate detectors not closer than 36 inch from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inch from lighting fixture and not directly above pendant mounted or indirect lighting.

G. Install cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.

H. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend full width of duct. Tubes more than 36 inch long must be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

I. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.

J. Remote Status and Alarm Indicators: Install in visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

K. Audible Alarm-Indicating Devices: Install not less than 6 inch below ceiling. Install bells and horns on flush-mounted back boxes with device-operating mechanism concealed behind grille. Install devices at same height unless otherwise indicated.

L. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inch below ceiling. Install devices at same height unless otherwise indicated.

M. Device Location-Indicating Lights: Locate in public space near device they monitor.

N. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that resists wind load of 100 mph with gust factor of 1.3 without damage.

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with black background and engraved white letters at least 1/2 inch high.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

3.7 PATHWAYS

A. Pathways above recessed ceilings and in inaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inch above floor must be installed in EMT.

B. Pathways must be installed in EMT.

C. Exposed EMT must be painted red enamel.

3.8 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

B. Make addressable connections with supervised interface device to the following devices and systems. Install interface device less than 36 inch from device controlled. Make addressable confirmation connection when such feedback is available at device or system being controlled.

1. Manual connection to post fire smoke purge system.
2. Alarm-initiating connection to stairwell and elevator-shaft ventilation.
3. Smoke dampers in air ducts of designated HVAC duct systems.
4. Magnetically held-open doors.
5. Electronically locked doors and access gates.
6. Alarm-initiating connection to elevator recall system and components.
7. Alarm-initiating connection to activate emergency lighting control.
8. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
9. Supervisory connections at valve supervisory switches.
10. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
11. Supervisory connections at elevator shunt-trip breaker.
12. Data communication circuits for connection to building management system.
13. Data communication circuits for connection to mass notification system.
14. Supervisory connections at fire-extinguisher locations.
15. Supervisory connections at fire-pump power failure including dead-phase or phase-reversal condition.
16. Supervisory connections at fire-pump engine control panel.

3.9 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."

B. Install framed instructions in location visible from FACU.

3.10 GROUNDING

A. Ground FACU and associated circuits in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Ground shielded cables at control panel location only. Insulate shield at device location.

3.11 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by the NYC Fire Department's inspectors and the Commissioner.

B. Administrant for Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

   a. Inspection must be based on completed record Drawings and system documentation that is required by "Completion Documents, Preparation" table in "Documentation" section of "Fundamentals" chapter in NFPA 72.
   b. Comply with "Visual Inspection Frequencies" table in "Inspection" section of "Inspection, Testing and Maintenance" chapter in NFPA 72; retain "Initial/Reacceptance" column and list only installed components.

2. System Testing: Comply with "Test Methods" table in "Testing" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for public operating mode in accordance with manufacturer's written instructions. Perform test using portable sound-level meter complying with Type 2 requirements in ASA S1.4 Part 1/IEC 61672-1.
4. Test audible appliances for private operating mode in accordance with manufacturer's written instructions.
5. Test visible appliances for public operating mode in accordance with manufacturer's written instructions.
6. Factory-authorized service representative must prepare "Fire Alarm System Record of Completion" in "Documentation" section of "Fundamentals" chapter in NFPA 72 and "Inspection and Testing Form" in "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.12 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate fire-alarm system. Provide video recording of instruction to City of New York.

3.13 SOFTWARE GUARANTY

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement must include software support for one (1) year.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within 1 years from date of Substantial Completion. Upgrading software must include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow City of New York to schedule access to system and to upgrade computer equipment if necessary.

END OF SECTION 284621.11

SECTION 310000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Work of this Section includes, but is not limited to the following:

1. Provide labor, materials, equipment, and services necessary to complete the excavation, foundation construction, filling and grading as shown on the drawings and specified herein.
2. Removal of existing pavements, curbs, tanks, abandoned pipes, utilities, and former foundation structures, etc., designated for removal; relocation of fence and fence posts when necessary and other structures encountered or left by wreckers, old walls, rubble, etc.
3. Local excavation for the removal of obstructions identified within the alignment of excavation support systems including backfilling, grading, and compacting of said areas after removal of obstructions or other deleterious materials.
4. General excavation to levels established within the Contract Drawings and as described herein.
5. All excavation of earth, concrete, construction debris, uncontrolled fill, remnants of foundations, and other materials to the bottom of foundation subgrades, pits and slabs as required and indicated on drawings.
6. Local excavation for the footings, mats, slabs, walls, pile caps, and other foundation elements indicated on the drawings and as directed by the Commissioner.
7. Excavation, fill placement, grading, and compaction to required elevations for appurtenances and general site work as shown on the drawings and as directed herein.
8. Excavation and trenching for mechanical trades, including but not limited to all plumbing, heating, water, steam, gas, and electric within and outside the site as shown or required by the drawings or as required to make the work complete; backfilling same with clean fill as described hereinafter, and thoroughly compacting to "rough grading" elevations.
9. Excavation and trenching for temporary works as shown or as required; backfilling same with approved fill; compaction and rough grading. Removal of unsuitable soils, replacement with approved fill materials, and compaction as dictated by site conditions or as directed by the commissioner.
10. Scarifying, compacting, controlling the moisture content of soils, and removal of unsuitable material to ensure proper preparation of areas to receive fill or proposed improvements.
11. Providing additional approved suitable material for filling and rough grading.
12. Legal off-site disposal of surplus excavated materials, and materials not suitable for re-use as fill or backfill. All earthwork handling and disposal shall be in accordance with the Project's Waste Management Plan.
13. Subgrade preparation at footings, slabs, and other foundation elements.
14. Protection of adjacent structures, utilities, and pavements.

15. Temporary groundwater control as required for execution of the work under this section and for all other related foundation work in accordance with Section 312319, "Dewatering".
16. All professional engineering and consulting required for the design and execution of the work of this Section.
17. Other labor, equipment, and materials as may be reasonably inferred to be required to make the work under this section complete.

B. Related Requirements, Sections, and Documents:
1. Examine the Contract Drawings for requirements that directly affect or are affected by work under this Section. A list of those documents and sections include, but is not limited to the following:

   a. Section 033000 "Cast-in-Place Concrete"

   b. Section 310900 "Geotechnical Instrumentation and Monitoring of Earthwork"
   c. Section 312319 "Dewatering"
   d. Section 315000 "Excavation Support and Protection"
   e. Section 316616 "Special Foundation Walls"

1.3 STANDARDS AND REFERENCES

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings.

B. Codes: All Work under this Section shall conform to the most restrictive requirements of the New York City Building Code (2014 edition).

C. ASTM (American Society for Testing and Materials) Specifications, latest edition:

1.	ASTM C 33	Standard Specifications for Concrete Aggregates.
2.	ASTM D 422	Standard Test Method for Particle Size Analysis of Soils (sieve only).
3.	ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
4.	ASTM D 2216	Test Method for Laboratory Determination of Water (Moisture) Content of Rock and Soil.
5.	ASTM D 2487	Test Method for Classification of Soils for Engineering Purposes.
6.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).
7.	ASTM D 3017	Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
8.	ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

D. ACI-318 - Building Code Requirements for Structural Concrete, latest edition.

E. ACI-299R - Controlled Low Strength Materials, latest edition.

F. The Contractor shall meet NYCDEP Limitations for Effluent, NYSDEC and EPA limitations for discharge into any surface water bodies, federal EPA and State Department of Transportation regulations for shipping of regulated substances to off-site disposal facilities, and meet all regulatory requirements imposed by the Treatment, Storage, and Disposal Facility. Regulations pertaining to the handling, transport, and disposal of regulated substances/materials include, but are not limited to the following:

1. USEPA Regulation 40 CFR Part 280, Underground Storage Tanks: Technical Requirements Final Rule and Office of Emergency and Remedial Response, Standard Safety Guides, PB92-983414.
2. New York City Fire Department, FP Directive 3-73 Division of Fire Protection, NYCAC Title 27, New York City Fire Prevention Code, Chapter 4 et seq., and Rule 21-02 of the City of New York. NYS Uniform Fire Prevention and Building Code (UFPBC) 1164.5.
3. NYS Department of Environmental Conservation (DEC)-Subdivision 6 NYCRR Part 613.9 (b) (DEC's Petroleum Bulk Storage (PBS) Regulation.
4. NYSDEC Petroleum Bulk Storage Regulations 6 NYCRR Part 613.9(b).
5. 6 NYCRR Part 360, Solid Waste Management Facilities, July 14, 1985.
6. 6 NYCRR Part 364, Waster Transporter Permits, January 10, 1985.
7. 6 NYCRR Part 371, Identification and List of Hazardous Waste, July 1, 1986.
8. 6 NYCRR Part 375 Environmental Remedial Programs, December 14, 2006.
9. NYSDEC, Ambient Water Quality Standards and Guidance Values.
10. NYSDEC Site Assessment at Bulk Storage Facilities, August 1, 1994, SPOTS Memo No 14.
11. NYSDEC Petroleum-Contaminated Soil Guidance Policy, August 1992, STARS Memo No. 1.
12. Rule 21-02 of the City of New York.
13. The New York City Building Code (2014 edition).
14. 29 CFR 1910 - Federal Occupational Safety and Health Administration (OSHA) standards.
15. NIOSH Occupational Safety and Health Guidance manual for Hazardous Waste Site Activities.
16. 29 CFR 1926 - Federal Construction Standards.
17. Resource Conservation and Recovery Act, 40 CFR Parts 260-265, Safe Entry and Cleaning of Petroleum Storage Tanks.
18. National Fire Prevention Association, Volume 30, "Flammable and Combustible Liquids Code."
19. National Fire Prevention Association, Volume 327, "Cleaning or Safeguarding Small Tanks and Containers without Entry."
20. US Department of Transportation (US DOT) 49 CFR Section 172.500 et seq.
21. American Petroleum Institute, API-2015A, "A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning."
22. American Petroleum Institute, API-2217A, "Guidelines for Work in Inert Confined Spaces in the Petroleum Industry."
23. American Petroleum Institute, API-2015, "Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks."
24. American Petroleum Institute, API-2016, "Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks."
25. American Petroleum Institute, API-1604, "Closure of Underground Petroleum Storage Tanks."
26. American National Standard Institute, ANSI 22882, "Standard Practice for Respiratory Protection."
27. American Society of Testing Materials, ASTM D 5088, Decontamination of Field Equipment Used at Non-radioactive Waste Sites.
28. National Institute for Occupational Safety and Health, NIOSH, "Working in Confined Space."
29. Department of Transportation 49 CFR 172 through 179.
30. Department of Transportation 49 CFR 387 (46 FR 30974).

31. Department of Transportation DOT-E 8876.
32. Environmental Protection Agency 40 CFR 136 (41 FR 52779).
33. Environmental Protection Agency 40 CFR 262 and 761.
34. Resource Conservation and Recovery Act (RCRA).
35. NYCDEC, Rules of the City of New York (RCNY), Title 15, Chapter 19, Use of the Public Sewers.
36. NYCDEP, Limitations for Effluent to Sanitary or Combined Sewers.
37. NYCDEP, Dewatering Sampling and Testing Requirements.

G. Any transporter of contaminated/hazardous materials shall be licensed in the state in which handling and transportation shall take place.

H. Comply with OSHA (Occupational Safety and Health Administration) Standards and Regulations contained in Title 29 CFR Part 1910.120 "Hazardous Waste Operations and Emergency Response."

I. In case of conflict between regulations and specifications, the Contractor shall comply with the most stringent requirements outlined in the specifications.

J. Nothing in clause 1.3 shall relieve Contractor of their responsibility of providing a higher standard in order to comply with this Specification.

1.4 DEFINITIONS

A. Wherever the word "excavating", "excavate", "excavation", "carried down", "remove", etc., are used, they shall be taken to include the removal of all existing work, including rubble, former foundation remnants, rubbish, earth, as well as rock, boulders, concrete and all other materials and obstructions encountered; they shall also be taken to include all temporary excavation support, bracing, groundwater control, and all other operations and items needed for the proper execution of the Work. Excavation is considered unclassified.

B. Rock and boulders over one cubic yard in size which cannot be removed or dislodged without blasting or drilling shall be classified as "rock excavation".

C. Where the words "finished grades", "finished grade lines", or "future finished grades", appear in these specifications, they shall be taken to mean the finished elevations as indicated on the Contract Drawings.

D. Rough grading consists of cutting or filling to the elevation herein established with a permissible tolerance of plus or minus 1 inch. This tolerance shall be used within any area of 100 square feet that it will not be necessary to remove excess or bring in additional fill to meet the required elevations.

E. Pre-excavation consists of excavation necessary to remove obstructions prior to installation of excavation support. Pre-excavation shall include all necessary backfilling and compaction to provide a suitable working surface for slurry wall construction.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

1.6 ACTION SUBMITTALS

A. Test Reports: Submit the following information for each source of each material submitted for review and comment by the Commissioner:

1. Test reports on borrow material as follows:

a. Particle size analysis in accordance with ASTM D 422 (sieve only)
b. Atterberg Limits in accordance with ASTM D 4318
c. Soil classification in accordance with ASTM D 2487
d. Moisture content in accordance with ASTM D 2216
e. Modified Compaction Curve in accordance with ASTM D 1557.

2. Include data for all samples indicating the exact location and methods of transportation and placement of all materials.
3. Include verification that borrowed material is not contaminated.

B. Plans and Shop Drawings: Submit detailed shop drawings and calculations to be reviewed by the Commissioner. The drawings and calculations shall be prepared by a Professional Engineer licensed in the State of New York. The submittals shall include but not limited to the following:

1. Earth excavation procedures.
2. Fill materials, equipment, and procedures for placement and methods of compaction, where required.
3. Backfilling and compacting material, equipment, and procedures.

C. Samples:

1. Where requested, the Contractor shall submit samples of materials proposed for use as fill, including, but not limited to general fill, drainage fill, structural fill, pavement subbase course, etc. Samples shall be submitted at least 1 week prior to proposed use on site. These reports as required under Section 1.6.A shall accompany each sample.

D. Submit mix designs, vendor information, materials test data and reports, and any other pertinent product data for all proposed concrete fill including but not limited to: structural concrete, lean concrete, and controlled low strength materials (CLSM). All concrete fill mix designs shall be prepared by a Professional Engineer licensed in the State of New York.

E. Catalog Cuts: Submit catalog cuts and manufacturer's literature for excavation and compaction equipment, and drainage materials.

F. All required certifications and permits pertaining to the work of this Section.

1.7 INFORMATIONAL SUBMITTALS

A. Monitoring Program: Monitoring shall be per Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

B. Certification for Examination of Site and Records: Before proceeding with the Work, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, existing adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports, the Contract Drawings, and all other relevant documents.

1.8 FIELD CONDITIONS

A. Subsurface Conditions: The subsurface conditions within the development area are generally characterized by uncontrolled fill overlying medium dense to dense granular soils with interspersed layers of silt and clay. Groundwater was measured at a depth of about 30 feet below grade (about el 22 ft). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Study report. See Appendix.

B. Borings logs are available for the Contractor's review.

C. Soil samples taken from the borings are available for the Contractor's inspection from the boring inspector.

D. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the City of New York and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

E. Interruption of Existing Utilities: Do not interrupt any utilities serving facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Commissioner's written permission.

F. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.

G. Examine the Contract Drawings to determine the sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.9 PROTECTION

A. The Work shall be executed so that no damage or injury will occur to the existing public and adjacent structures, streets, paving, sewers, gas, water, electric or any other pipes. Should any damage caused by the Contractor, or anyone in Contractor's employ, or by the work under this Contract occur, the Contractor shall, at their own expense, repair such damage

B. The above shall also include the protection of all existing utilities (including sewers, water lines, electrical lines and telecommunication lines) to remain in use within and adjacent to the area affected by the Work of this project.

C. Monuments, benchmarks and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, replace them at no additional expense to the City of New York.

D. Excavation sides, adjacent structures, and foundations shall be protected by means of adequate bracing, shoring, and anchoring at all times. Excavation shall not proceed until adequate support for excavation sides is provided. Contractor is solely responsible for the stability, safety, and protection of excavation sides.

E. Provide barricades and warning lights and barriers to prevent accidents, to avoid all necessary hazards and protect the public, the Work, and property at all times, including Saturdays, Sundays, and Holidays.

F. Provide protection to sidewalks and pedestrians as required.

G. Erosion and Sediment Control and dust control shall be in accordance with the Contractor's Site Management Plan.

H. Support of Excavation shall be in accordance with Section 315000, "Excavation Support and Protection".

I. Monitoring shall be in accordance with Section 310900, Geotechnical Instrumentation and Monitoring of Earthwork".

J. The Contractor shall maintain the cleanliness of paved streets immediately adjacent to the site through regular sweeping and moistening as required to remove any excess mud, dirt, or rocks tracked from the site. Materials shall be covered with a tarpaulin during transport offsite.

1.10 ERRORS IN DEPTH

A. In the event that any part of the excavation is carried, through error, beyond the depth and the dimensions indicated on the Contract Drawings or called for in the specifications, then the Contractor, at their own expense, shall furnish and install gravel, stone, or concrete fill with which to fill to the required level at all locations, subject to approval of the Commissioner.

1.11 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Materials and Work shall conform to the latest edition of reference standards specified herein:

1. All work shall comply with the requirements of the New York City Building Code (2014 edition), requirements of the New York State Department of Labor, requirements of Occupational Safety and Health Administration (OSHA), requirements of New York State Department of Health (NYSDOH), requirements of the New York State Department of Environmental Conservation (NYSDEC), requirements of the New York City Department of Environmental Protection (NYCDEP), requirements of the New York State Department of Transportation (NYSDOT), requirements of New York City Department of Transportation (NYCDOT).
2. The Contractor shall procure and pay for all permits and licenses required to complete the Work of this Section.

C. Contractor Qualifications: The Contractor performing the Work of this Section shall demonstrate that they have at least three years of recent field experience on projects of similar size, scope, and complexity.

1.12 QUALITY CONTROL

A. Special Engineering Inspection:

1. The City of New York performs all Special Inspections under a separate contract.
2. Earthwork activities shall be observed on a full-time basis, unless otherwise approved by the Commissioner.

B. The Contractor shall cooperate fully with the Special Inspector(s) in the performance of their work.

C. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities.

D. Retesting of rejected materials and installed work shall be Contractor's responsibility and shall be performed at their expense.

E. The Contractor shall notify the Commissioner and all other necessary parties at least 72 hours prior to each day of required inspection to allow for the appropriate personnel to be on site.

F. The role of the Special Inspector(s) shall not relieve the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Drawings.

1.13 PRECONSTRUCTION MEETINGS

A. Preconstruction Conference: Before commencing Work of this Section, the Commissioner will arrange a series of meetings to discuss coordination and scheduling. Parties to be present: Testing Laboratory, Commissioner, Special Inspector(s), and any other parties deemed necessary by the Commissioner. Review the excavation and earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least three (3) working days prior to convening conference. Record discussions and agreements and furnish a copy of meeting minutes to each participant.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Site soils may be re-used provided they meet the project environmental criteria and the criteria provided in this Section.

B. Structural Fill: Well graded granular soil containing not more than 10 percent by weight of material finer than a No. 200 mesh sieve and not more than 20 percent retained on a ¾ inch sieve with a maximum particle size of 2 inches.

C. Drainage Fill: Clean ¾-inch gravel meeting the requirements of NYSDOT Item No. 605.0901, Underdrain Filter, Type I or AASHTO Gradation #57.

D. General Fill: Shall be no more than 20% by weight of stones or masonry debris, containing no stones or other materials greater than 4 inches in any dimension and contain less than 20% by weight materials finer than No. 200 mesh sieve.

E. Pavement Subbase Fill: Subbase materials below asphalt and concrete pavements shall consist of clean granular soils, crushed stone, or recycled concrete aggregate conforming to the requirements of NYSDOT Item No. 304.14, Subbase Course, Type 4.

F. Fill for utility trenches shall meet the criteria given for structural fill and shall not contain sharp, angular pieces and pieces larger than 2 inches in any dimension.

G. Before bringing any fill to the site, the Contractor shall submit the source for approval by the Commissioner.

H. All fill materials (structural, granular, and general fill) shall be free from wood, debris, combustible materials, vegetable matter or any material subject to decay or disintegration. Fill material shall not be contaminated.

I. The use of recycled concrete aggregate as structural or general fill shall be permitted provided it meets the gradation requirements above and is deemed acceptable by the Commissioner.

J. The use of mole rock shall not be permitted.

2.2 CONCRETE MATERIALS

A. Lean concrete shall conform to ACI 301.

B. Controlled low strength material (CLSM) shall conform to ACI 299R.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for “Execution Requirements”.

3.2 GENERAL SITE PREPARATION

A. Notify the Commissioner before the start of work. The notifications are to be in accordance with the Contract Drawings.

B. The Contractor shall furnish all labor, equipment and materials required to prepare site and to excavate all materials of whatever type encountered to the lines and grades shown on the Contract Drawings and as specified.

C. The Contractor shall give 72 hours advance notice to the Commissioner and Special Inspector(s) of the impending completion of excavations so as to allow inspection of the exposed surface for footings, pile caps, slabs and pads and review the ground water conditions in accordance with the New York City Building Code (2014 edition) requirements for Special Inspection.

D. The Contractor is to obtain and pay for all necessary permits to perform the Work prior to start of such work.

E. Install all necessary protection equipment, structures such as fences, signs, scaffolding, etc. before the start of work.

F. Remove all existing structures, utilities, pavement in accordance with the Contract Drawings.

G. Protect all utility lines which are not to be abandoned. Contractor shall be responsible for any damage to utilities that may occur.

H. Perform test pits alongside each of the adjacent buildings to determine the extent and depth of the below-grade space and the foundation type.

I. Stockpile on-site materials anticipated for re-use. Care shall be taken to avoid blending with the deleterious materials. Stockpiling shall comply with the requirements of the Contractor's Site Management Plan and any requirements set forth by the Commissioner.

3.3 GROUNDWATER AND SURFACE WATER CONTROL

A. Groundwater control shall be in accordance with Section 312319, "Dewatering", and as specified herein.

B. The Contractor shall assume the responsibility for site drainage and shall maintain such drainage during the life of this contract in a manner so as not to adversely affect adjacent areas and structures.

C. The Contractor's groundwater control system shall be capable of maintaining dry stable subgrade conditions.

D. Provide adequate pumps, or other equipment, appurtenances, power, drains, materials and labor necessary to excavation continuously dry during excavation, foundation construction, and backfilling and at such other times as the progress of the work may demand or as necessary to ensure safety to the structure shall be provided. The Contractor shall be responsible for maintaining groundwater levels at least 2 feet below the levels of any excavation.

E. All pumping both inside and outside the areas of the building shall be performed, continued, and maintained as required for the completion of all Work, including the work of the mechanical trades, throughout the period of the contract. The Contractor shall provide adequate backup systems in the event of equipment failure or malfunction.

F. Manage runoff to limit the impact on construction.

G. The dewatering system or systems shall be installed and operated in such a manner as to avoid the movement of fines or loss of ground from below the bearing level and shall not influence the stability of surrounding areas. The facilities needed to eliminate loss of ground shall be included.

H. The Contractor's groundwater control system shall consider methods and measures necessary to reduce inflow through soils, including but not limited to grouting and installation of sumps or pumping wells in an effort to minimize daily discharge quantities.

I. Do not use any portion of the building foundation units or any part thereof as a sump for drainage resulting from pumping in any other area. Do not conduct water to privately owned properties.

J. The Contractor's work shall not result in damage to adjacent property. Protect adjacent property from the effects of groundwater lowering, as required.

K. Where required, the Contractor shall be responsible for obtaining all necessary discharge permits.

L. The Contractor shall be responsible for controlling surface water on site. Excavations shall be protected from deleterious effects of surface water accumulation. The Contractor shall grade accordingly to minimize run-off from entering and accumulating excavations.

3.4 GENERAL EXCAVATION

A. The excavation shall be unclassified and shall comprise and include the satisfactory removal and legal disposal of all materials encountered regardless of the nature of the materials and shall be understood to include, boulders, earth, hardpan, miscellaneous fill, foundations, demolition debris from on-site buildings, structures, slabs, walls, utilities, pavements, curbs, piping and debris and shall comply with the project environmental requirements.

B. All excavation shall be properly sized and shall extend to the depths of the form and size required for the installation of the work as indicated on the drawings. When excavations for foundation and site work have reached the required depths, the Special Inspector(s) shall make an inspection of the conditions.

C. Excavation shall be to required elevations for the bottom of the foundation, cut-and-fill, etc. Excavation shall be made to a depth that will allow installation of the full depth of concrete slabs and any sub-base materials as shown on drawings with a 1-inch tolerance. Excavation lines shall provide sufficient clearance for the proper execution of all concrete work including allowances for formwork, shoring, and inspection.

D. Materials that, in the opinion of the Commissioner, are not suitable for backfill, and any surplus earth, and all rock shall be removed from the site and legally disposed of.

E. A 3-inch-thick concrete mud-slab shall be required on all surfaces that will require horizontal waterproofing. All vertical surfaces to receive "blind-side" waterproofing shall require a flat/rigid substrate. Where required, waterproofing shall be installed in accordance with the drawings and specifications.

F. The bottom of excavations shall be leveled off, free of standing water, snow, ice and loose materials, and graded to receive foundations, slabs, pits, trenches, and grade beams.

G. Subgrades shall be level and free of loose soil, standing water and frost prior to acceptance for placement of concrete or fill. Hand-excavate to achieve final subgrade elevation as directed by the Commissioner.

3.5 EXCAVATION FOR BUILDING SLABS AND STRUCTURAL MEMBERS

A. Subgrades of building slabs and structural members including framed slabs, pile caps, grade beams, and other structural members shall be approved by the Commissioner before proceeding with their construction. Subgrades resulting from excavation shall be free of unsuitable material (fill, loose rock pieces, organics, debris, etc.) as judged by the Special Inspector(s). Bottoms of footings shall be founded on materials suitable for achieving the bearing pressures indicated on the drawings and as approved by the Commissioner.

B. Subgrade Bearing Capacity: The subgrade bearing capacity shall be as indicated on the Contract Drawings.

C. Unauthorized Excavation: Excavations performed below the elevations shown or specified, shall be filled and compacted as hereinafter specified, at no additional expense to the City of New York.

D. Authorized Additional Excavation: Where the Commissioner determine that the bearing material encountered is unsuitable, remove the unsuitable bearing material. The removed material shall be replaced with controlled fill or concrete as directed by the Commissioner.

3.6 GENERAL SUBGRADE PREPARATION

A. Proofrolling shall be performed for all soil subgrades within and outside the limits of the proposed development including all adjacent site work and pavements.

B. All soil subgrades shall be proofrolled in the presence of the Commissioner.

C. Proofrolling shall be accomplished with a minimum of six (6) overlapping cross-rolled coverages of a smooth drum vibratory roller having a static weight of at least 8 tons or as approved by the Commissioner. A vibratory trench roller having a static weight of at least 1.5 tons shall be utilized in confined areas as approved by the Commissioner. Areas inaccessible to the heavy equipment shall be compacted using a vibratory plate or jumping jack compactor as directed by the Commissioner. The maximum travel speed of rollers should not exceed 1.5 mph.

D. Vibratory or impact compaction shall not be performed on soils which are not within 2% of the optimum moisture content as determined by ASTM D 1557.

E. Fill shall not be placed until the subgrade is approved by the Special Inspector(s).

F. Soft Areas during Compaction: Areas deemed unsatisfactory due to "pumping, rutting, or heaving" shall be undercut within the limits and extent ordered by the Commissioner. These areas shall be replaced with an approved fill, and compacted to the requirements of this Section or as directed by the Commissioner.

3.7 FILLING, GRADING, AND COMPACTING

A. Filling and backfilling shall not be performed until work has been accepted by the Commissioner. All wood, paper, and other deleterious materials shall be cleaned out from excavations before backfilling.

B. All subgrades shall be free of water, snow, ice, wood, organics, or other deleterious materials prior to placement of any fill.

C. The filling or backfilling within the area of the building shall be done so that there will be no void spaces below floors and bottoms of pits, trenches, pipe haunches, pavements, etc. unless otherwise noted.

D. Fill shall not be placed against concrete elements until the concrete has obtained its specified compressive strength, unless otherwise directed by the Commissioner. Where fill is required on both sides of a wall, said fill shall be brought up simultaneously and evenly on both sides.

E. Fill voids caused by the removal of boulders, and/or below grade improvements, with lean concrete, CLSM, or structural fill.

F. The Contractor shall supply and install all fill materials necessary to bring the ground surfaces to the required levels as shown on the drawings and as necessary to make the work complete.

G. All surplus materials shall be removed from the site and legally disposed of. Should additional material be required for the placing of backfill, other than material obtained from the site, the Contractor shall obtain, deliver, and place accepted backfill material as required.

H. Fill Placement:

1. Begin placement of fill and backfill at the lowest section of the area. Spread material evenly by mechanical equipment or by manual means above the approved compacted subgrade in lifts not exceeding 12-inches for material compacted by heavy machinery and 4-inches for material compacted by light machinery or by hand tamping.
2. Build layers as horizontally as practical to prevent thickness of lift from exceeding that specified but provide with sufficient longitudinal and transverse slope to provide for runoff of surface water from every point.

I. Moisture Control: The moisture-density curve for the fill used shall be supplied by the Contractor as a guide in controlling moisture to achieve the required degree of compaction. If, in the opinion of the Commissioner, fill material becomes too wet for the required compaction, the fill shall be dried by a method approved by the Commissioner prior to commencing or continuing compaction operations. Likewise, if, in the opinion of the Commissioner, the fill material becomes too dry for the required compaction, the fill shall be moistened by a method approved by the Commissioner prior to commencing or continuing compaction operations.

J. Compacting: Compact each layer of fill with the appropriate equipment listed below in this Article to achieve as a minimum the following percentages of maximum density at optimum moisture when tested in accordance with ASTM D 1557 (Modified Proctor Test):

LOCATION	% MAX. DENSITY
Footings, slabs-on-grade,	95

pavement, and utilities	
Pile Supported Structures, including framed slabs	92
Behind Foundation Walls	95

K. The degree of compaction shall be checked by the Commissioner and each successive lift shall not be placed or compacted until the previous lift is inspected and approved by the Commissioner. Compact all fill to elevations and limits shown on Contract Drawings.

L. Backfilling against Foundation Walls: After completion of foundation walls and removal of forms, clean the excavation of all trash and debris before application of waterproofing and/or vapor barrier and placement of backfill.

M. Frost: Do not place fill materials when either the fill materials or the previous lift (or subgrade) on which it is placed is frozen. In the event that any fill which has already been placed on the surface shall become frozen, it shall be scarified and recompacted, or removed, to the approval of the Special Inspector(s) before the next lift is placed. Remove or recompact any soft spots resulting from frost to the satisfaction of the Special Inspector before new fill is placed.

N. Do not backfill against foundation or basement walls until completion of supporting floor construction to the top of backfill or first level above the top of backfill, unless adequate temporary shoring is provided.

O. If Contractor elects to backfill against foundation or basement walls before completion of supporting floor slabs, these walls shall be shored. Temporary shoring shall be designed by a Professional Engineer licensed in the State of New York, retained by the Contractor. Shoring design and calculations shall be submitted to the Commissioner for review and approval.

P. In placing backfill, take special care to prevent wedge action, eccentric loading or overloading of the structure by equipment used for compacting backfill material, and to prevent damage to waterproofing on walls. Where subsoil drainage systems are installed, place backfill to prevent any damage to the systems. Any damage to waterproofing or drainage systems caused by backfilling or excavation operations shall be corrected or replaced by the Contractor at their own expense.

Q. Additional backfilling required to bring fill to the finished subgrades shown shall be done by the Contractor only after the concrete walls or piers, against which the backfilling is done, have attained their full design strength, have been braced, and the written permission to backfill is obtained from the Commissioner. If fill is required on both sides of a wall, it shall be brought up simultaneously and evenly on both sides.

R. Do all filling necessary to bring the ground surfaces to the required levels for floors, pits, and areaways as shown on the drawings.

3.8 PROTECTION

A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.

B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.

C. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

D. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

E. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

F. Where settling is measurable or observable at excavated areas during general project warrantee period, remove surface (pavement, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.9 FIELD QUALITY CONTROL

A. The Commissioner shall review all laboratory test results and submitted reports specified in this Section.

B. The Commissioner shall interpret the tests, state in each report whether or not the test specimens and results comply with all requirements of the Contract Drawings, and note any deviations.

C. The Commissioner shall identify when and where samples are to be obtained for testing.

D. The Contractor shall collect samples and forward them to a Testing Laboratory. Testing Laboratory will submit the following laboratory test reports to the Commissioner:

1. Laboratory results conducted on each type of borrow and fill material:

    a. Gradation Analysis - ASTM D 422
    b. Atterberg Limits - ASTM D 4318
    c. Modified Moisture Density Curve Determination - ASTM D 1557

2. The Commissioner will review for conformance of materials to be used for fills, based on the gradations given in these specifications.

E. Engineering Inspection:

1. All engineering inspections shall comply with the requirements of the New York City Building Code (2014 edition).
2. Building Slab Subgrades: The Special Inspector(s) shall inspect subgrades for all building slabs and footing elements. No pavement, slab, or footing shall be constructed unless the subgrade is approved by the Special Inspector(s).
3. Proofrolling: Proofrolling operations shall be inspected by the Special Inspector(s).

4. Backfilling and Compaction: Backfilling and compaction below foundations, slabs, behind foundation walls, and any other backfilling and compaction work shall be inspected by the Special Inspector(s). No fill shall be placed unless the previous lift is approved by the Special Inspector(s). The Special Inspector(s) shall take field density tests of the subgrade for every 1,000 square feet, but not less than 3 tests in each compacted fill layer. Field density tests shall be performed in accordance with ASTM D 2922.

3.10 CLEAN-UP

A. All excess material including, earth, rock, fill, shall be removed from the site and legally disposed of in accordance with the DDC General Guidelines.

B. All lumber, forms and metalwork shall be removed immediately after completion of local areas. Remove all debris produced by Work of this Section from the site.

C. Sidewalk and streets adjoining the property shall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the Work of this Section.

D. The removal and disposal shall be in accordance with project environmental requirements.

3.11 CLOSEOUT

A. Substantial Completion Requirements:

1. Provide final cleaning immediately prior to Substantial Completion inspection.
2. Corrective Work: Remove, repair, and reinstall, or restore in place damaged items. Replace damaged materials or items with new if repair not acceptable to the Commissioner.
3. Provide product data to complete Operation & Maintenance Manuals.

3.12 WASTE MANAGEMENT

A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION 310000

SECTION 310900 - GEOTECHNICAL INSTRUMENTATION AND MONITORING OF EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract".

1.2 SUMMARY

A. Section includes all labor, materials, equipment, and accessories necessary for the completion of all monitoring work as shown on the Contract Drawings, as specified herein, and as required by the conditions at the site.

B. The work of this Section includes, but is not limited to the following:

1. All labor, equipment, materials, and accessories necessary to execute the work of this Section as specified herein.
2. Collection, cataloging, and compilation of the existing adjacent buildings, infrastructure, and other structures to remain within 100 feet (horizontally) of the work limits (i.e., Pre-Construction Conditions Documentation).
3. Furnish and install optical survey targets, surveying marks, seismographs, benchmarks, settlement monitoring points, inclinometers, extensometers, and pressure cells, as required and as outlined herein.
4. Furnish all equipment and labor to provide continuous vibration monitoring within adjacent structures.
5. Provide all engineering services required to develop and prepare a monitoring plan meeting the minimum requirements outlined herein and as indicated on the Contract Drawings.
6. Provide all surveying services required for performing optical survey monitoring on the adjacent structures as outlined herein.
7. Provide all labor necessary for the periodic measurement of any installed crack gauges installed under this Section.
8. Compilation and transmittal of monitoring and instrumentation data during construction.
9. Provide all other labor, equipment, and materials as can reasonably be inferred to make the Work of this Section complete.

C. Related Requirements:

1. Work governed by this Section, as shown or specified shall be in accordance with the requirements of the Contract Drawings and the New York City Building Code (2014 edition).
2. Work of this Section, as shown or specified, shall be in accordance with the Support of Excavation drawings.
3. Examine the Contract Drawings for requirements that directly affect or are affected by work under this Section. A list of those documents and sections include, but is not limited to the following:

a. Section 033000 "Cast-in-Place Concrete"

b. Section 310000 "Earthwork"
c. Section 312319 "Dewatering"
d. Section 315000 "Excavation Support and Protection"
e. Section 316616 "Special Foundation Walls"

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions, Section 013300 "Submittal Procedures".

1.4 ACTION SUBMITTALS

A. Submit method statement describing the type of equipment to be implemented for optical surveying, extensometers, pressure cells, crack gauges, and any other instrumentation proposed. Describe installation, location, operation, and maintenance of equipment, as necessary.

B. Submit work plan detailing the installation, operation, and maintenance of all equipment.

C. Submit product cut-sheets and calibration data and identify the allowable tolerances of all proposed equipment.

1.5 INFORMATIONAL SUBMITTALS

A. Submit Pre-Construction and Post-Construction Documentation Reports to the Commissioner for distribution. Documentation shall include all applicable plans, sketches, notes, and photographs logging the conditions of all structures and thoroughfares located within 100 feet of the work limits.

B. Submit as-built plan showing location of all instrumentation and crack gauges installed to document movements during construction activities.

C. Monitoring Plans:

1. The Contractor shall develop and prepare a monitoring plan meeting the minimum requirements outlined herein and as shown on the Contract Drawings.
2. The Contractor shall submit drawings showing proposed monitoring points. The drawings shall, at a minimum, include a plan view layout with appropriate elevation of all instrumentation and monitoring locations. The plans shall additionally include all section and elevation views necessary to accurately convey the locations of monitoring points. The plan shall graphically identify the type of monitoring point (i.e., optical survey, surface points, seismographs, crack gauges, borehole instruments, benchmarks, etc.), with each monitoring point bearing a unique identification number. Where required, provide elevation and section drawings (i.e., excavation faces, building facades, tunnel walls, etc.) and identify the elevations (North American Vertical of 1988 Datum NAVD88) at which monitoring points have been or will be installed.
3. The drawings shall be updated and resubmitted in the event that monitoring points are abandoned, relocated, or additional monitoring points are added.

D. Submit sample survey monitoring report for approval by the Commissioner. Monitoring data shall be provided showing cumulative moment both graphically and in tabular format as referenced to a baseline measurement. Dates and time shall be provided for all monitoring intervals.

E. Submit all monitoring data directly to the Commissioner. Measurement data shall be submitted within 24 hours of taking each reading. All data shall be transmitted in electronic format suitable to the Commissioner. Transmitted data shall show all cumulative measurements recorded as a function of time. Requisite notes shall be included to document construction activities performed during the monitoring increment.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

B. The Contractor shall retain the services of a Land Surveyor, licensed in the State of New York, to perform all survey monitoring during construction. The Contractor's surveyor shall have at least three years of professional experience or as approved by the Commissioner.

C. The Contractor shall retain the services of a qualified Professional Engineer, licensed in the State of New York, to evaluate and report all monitoring data during construction. The Contractor's Engineer shall have at least three years of professional experience or as approved by the Commissioner.

D. Codes and Permits:

1. Comply with the New York City Building Code (2014 edition).
2. All labor, materials, equipment, and services necessary to make the work comply with such requirements shall be provided without additional cost to the City of New York.
3. The Contractor shall procure and pay for all permits and licenses required to complete the work of this Section.

1.7 SCHEDULING OF WORK

A. Pre-Construction Conditions Documentation of all below grade structures and other adjacent structures shall be completed at least 10 days, but no more than 60 days, prior to commencing earthwork and foundation construction, including but not limited to general earthwork, support of excavation installation, or other foundation or support of excavation related construction.

B. Locations for crack gauges shall be determined during performance of the Pre-Construction Conditions Documentation. Crack gauges shall be installed as required to catalog and record the conditions of existing cracks.

C. Seismographs shall be installed during or following performance of Pre-Construction Conditions Documentation. Seismographs shall be installed to allow for sufficient time to evaluate background vibration levels.

D. Additional crack gauges or seismographs shall be installed as required by earthwork and foundation construction activities.

E. Survey targets, benchmarks, and settlement monitoring points shall be installed at least 10 days prior to commencing with earthwork and foundation construction, including but not limited to general earthwork, installation of support of excavation, or other foundation or support of excavation related construction.

F. Additional monitoring points shall be established as required during construction.

1.8 GENERAL MONITORING

A. General monitoring shall include but not be limited to measurement of construction induced vibrations, vertical and lateral deflection of structures and utilities, inclination, soil/ground movement, and crack movement. Monitoring shall be performed prior to and during earthwork and foundation construction to evaluate the performance of the Contractor's activities.

B. The field locations for all monitoring devices shall be coordinated with the City of New York, the Commissioner.

C. The Contractor shall be responsible for all maintenance of equipment as required to maintain monitoring on a continuous basis throughout the duration of earthwork and foundation construction activities.

D. All general monitoring data shall be transmitted to the Commissioner.

1.9 VIBRATION AND CRACK MONITORING

A. Monitoring shall include construction vibrations and periodic measurement of existing cracks, where present. Monitoring shall be performed prior to and during earthwork and construction to evaluate the performance of the Contractor's activities.

B. The field locations of seismographs shall be coordinated with the Commissioner.

C. The Contractor shall be responsible for all maintenance of equipment as required to maintain monitoring on a continuous basis throughout the duration of construction activities on site.

D. Crack monitoring and vibration monitoring data shall be transmitted to the Commissioner..

1.10 SURVEY MONITORING

A. Survey monitoring shall include installation of survey monitoring points and periodic measurement of horizontal and vertical movements. The final location of survey monitoring points shall be established by the Contractor, but at a minimum shall include all areas identified on the Contract Drawings.

B. Survey monitoring data shall be transmitted to the Commissioner.

1.11 ADDITIONS

A. The Contractor may elect to provide additional types of monitoring not specifically outlined herein, but shall at a minimum conform to the requirements of this Section. Where additional types of monitoring are proposed, the Contractor shall inform the Commissioner in writing, and shall provide all information as requested by the Commissioner.

B. The Contractor shall be solely responsible for all means and methods not specifically addressed herein.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. The Contractor shall submit all details and other supporting data for materials proposed for use in performing the Work of this Section.

B. Optical Survey Targets: Survey targets shall consist of self-adhesive reflective sheet targets suitable for adherence to wood, steel, brick, concrete, etc.

C. Surface Marker 1 (SM1): A ¼-inch by 2-inch PK nail set in paved streets or sidewalks with a 1-½" diameter hub identification tag.

D. Surface Marker 2 (SM 2): Scribe surface of monitoring point as required to maintain permanent demarcation of the location. Scribed locations shall be identified on all drawings.

E. Seismographs: Seismographs shall include a cellular modem or other means to allow for continuous real-time monitoring and alert via email and internet. Geophones and cases shall be affixed to the liner walls or other structures by means of concrete anchor bolts. Portable units, mounted directly on the ground, shall be installed in accordance with the manufacturer's requirements.

F. Crack Gauges: Provide grid crack gauges and anchors, bolts, screws and quick setting epoxy. A minimum of 10 gauges shall be procured prior to execution of the Pre-Construction Conditions Documentation.

G. Optical Survey Equipment: Optical surveying equipment shall be suitable for achieving the following accuracies and repeatability:

1. Vertical: at least plus or minus 0.005 ft
2. Horizontal: at least plus or minus 0.005 ft

H. Groundwater Observation Wells: Groundwater wells shall be constructed using a minimum 10 foot section of slotted screen, and a minimum 10 foot section of solid riser consisting of 2-inch diameter, Schedule 40 PVC. The annulus shall be backfilled with No. 1 filter sand to a minimum of 1 foot above the top of the slotted screen. The annulus above the filter sand shall be sealed using a bentonite holeplug, 3/8-inch coarse grade Wyoming sodium bentonite. A steel flush mount cap shall be placed at the ground surface.

I. All proposed materials and equipment shall be submitted to the Commissioner for review and approval prior to procurement or delivery to the site.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for "Execution Requirements".

3.2 GENERAL INSTALLATION

A. Install monitoring systems prior to commencing construction activities.

B. Install all equipment in accordance with the manufacturer's recommendations.

C. Submit drawings showing the as-built locations for all monitoring points installed, listing unique identifiers for each point, and the type of monitoring.

D. Install additional monitoring points as required as the work progresses. Replace all locations that are lost, damaged, or vandalized.

E. Monitoring equipment shall be installed in accordance with the manufacturer's recommendation and the Contractor's work plan.

3.3 INSTALLATION OF CRACK GAUGES

A. Cracks shall be photographed and mapped prior to installation of crack gauges. The location of crack gauges shall be made in consultation with the Commissioner.

B. Installation shall be in accordance with the manufacturer's recommendations.

C. Write ID # on gauge with permanent marker.

D. After completion of installation, check that gauge parts are free to move over each other by passing a feeler gauge or thin plastic card between the two sections.

E. After completion of installation, the as-built location and initial movement (if any) shall be recorded.

F. Photograph crack gauge following installation and all subsequent readings.

3.4 MONITORING LOCATIONS

A. The minimum number of locations and approximate orientation of all monitoring points shall be shown on the Contract Drawings and as outlined below:

1. Buildings and Structures adjoining the proposed construction:

    a. Survey Targets or Survey Marks: Monitoring locations shall be evenly spaced at 25 foot centers at the base and roofline of adjacent structures to determine movement in critical areas such as cracked facades, etc.
    b. Seismographs: Install seismographs as shown on the Contract Drawings, or as directed by the Commissioner.
    c. Crack Gauges: Gauges shall be installed at cracks observed during execution of the Preconstruction Conditions Documentation and as required as the work progresses, as determined by the Contractor, and as directed by the Commissioner.

2. Support of Excavation Systems and Temporarily Shored Existing Below Grade Walls:

    a. Survey Targets and Survey Marks: Install monitoring points at 20 feet on-center or as indicated on the Contract Drawings. Survey targets and survey marks shall be positioned as close as possible to the ground surface and should be affixed to concrete faces. Additional targets or marks shall be installed for each 15 feet of exposed vertical height.

3.5 BASELINE MEASUREMENTS

A. Baseline measurements for all equipment shall begin a minimum of 10 days prior to execution of construction activities.

B. Establishment of trigger values for vibration monitoring shall consider background vibration levels. Background levels shall be recorded prior to commencing construction activities to determine ambient levels of vibration resulting from vehicular traffic. Trigger values for seismographs shall be maintained at 0.5 inches per second above that of the peak background levels recorded unless otherwise stated in the Contract Drawings.

3.6 FREQUENCY OF MONITORING

A. At a minimum, survey monitoring readings shall be performed twice weekly during excavation. The frequency of monitoring shall be increased or decreased as directed by the Commissioner.

B. At a minimum, crack gauges shall be read and recorded on a weekly basis. The frequency of monitoring shall be increased as directed by the Commissioner.

C. Vibration and groundwater monitoring shall be performed on a continuous basis (24/7).

3.7 DATA FORMAT AND TRANSMITTAL

A. Data shall be transmitted in an electronic format (MS Excel) and shall include all cumulative readings taken. Data shall include baseline values and offset measurements. Provide coordinates for readings, as requested. Include the following information for all readings:

1. Instrument type.

2. Date and time of readings.
3. Name of observer.
4. Monitoring Point ID #.
5. Readings.
6. Incremental and cumulative deviation of readings.
7. Weather condition and temperature.
8. Remark of any visual observations of conditions and construction activities.

B. Transmit all data to the Commissioner within two days of taking measurements. Contact the Commissioner immediately in the event that values exceed threshold values specified herein.

3.8 REVIEW AND LIMIT VALUES

A. The following criteria shall be used to evaluate the necessity for modifying or ceasing construction activities. Where a work stoppage is required, construction activities shall not continue until adequate measures are in place to ensure stability of adjacent structures, excavation support, or utilities. Where movements in excess of the Review level are detected the frequency of data collection shall be increased to once daily, or as directed by the Commissioner. The criteria provided shall not relieve the Contractor of any responsibility with respect to damage incurred by any structures or utilities.

1. Vibration Monitoring: Peak particle velocities

    a. Review Level

        1) 0.5 inches per second for all buildings, and other structures.

    b. Limit Level

        1) 2.0 inches per second for all buildings, and other structures.

2. Crack Gauge Monitoring: Cumulative movement in any direction

    a. Review Level - 1/16-inch in any direction
    b. Limit Level - 1/8-inch in any direction

3. Survey Monitoring: Displacement

    a. Review Level:

        1) Buildings and other structures

            a) Vertical Movement: 3/16-inch total movement, or 1/8-inch between two consecutive readings
            b) Horizontal Movement: 3/16-inch total movement, or 1/8-inch between two consecutive readings
            c) Angular Distortion: 1/1000

        2) Support of Excavation

a) Vertical Movement: 1/2-inch total movement, or 1/8-inch between two consecutive readings
b) Horizontal movement: 1/2-inch total movement, or 1/8-inch between two consecutive readings
c) Angular distortion: NA

b. Limit Level:

1) Buildings and other structures

a) Vertical Movement: 1/4-inch total movement, or 3/16-inch between two consecutive readings
b) Horizontal Movement: 1/4-inch total movement, or 3/16-inch between two consecutive readings
c) Angular Distortion: 1/500

2) Support of Excavation

a) Vertical Movement: 3/4-inch total movement, or 3/16-inch between two consecutive readings
b) Horizontal Movement: 3/4-inch total movement, or 3/16-inch between two consecutive readings
c) Angular distortion: NA

3.9 ACTION ITEMS

A. Any movement or vibration exceeding the criteria outlined in 3.7 above shall be reported immediately to the Commissioner. Work in the immediate area shall be suspended, unless directed otherwise by the Commissioner. Corrective measures to ensure integrity and stability of adjacent structures shall be the responsibility of the Contractor.

B. In the event that a Review Level is reached, the following shall be required:

1. The Commissioner shall be immediately notified of the exceedance.
2. The exceedance shall be investigated to identify potential correlation to construction activities.
3. The Contractor shall meet with the Commissioner to discuss the need for a response to mitigate the potential for readings exceeding the Review Level.
4. Where required, submit a detailed plan of action to mitigate the potential for additional movement or vibration.
5. Install additional instruments as required to evaluate the need for any action necessary to prevent reaching the Limit Level.

C. In the event that a Limit Level is reached, the following shall be required:

1. The Commissioner shall be immediately notified of the exceedance.
2. The exceedance shall be investigated to identify potential correlation to construction activities.
3. Construction shall be suspended and the structures shall be inspected by the Commissioner, NYCDOT and NYCDOB.

4. The Contractor shall take all actions necessary to protect structures and utilities and maintain integrity and stability of said structures and utilities. The Contractor shall be solely responsible for providing all necessary services in conjunction with developing and applying remedial measures including any required engineering design.
5. The adjacent structures shall be visually inspected, and construction methods modified as necessary to maintain vibrations within acceptable levels.

D. Corrective actions requiring repair of any structure shall be the sole responsibility of the Contractor. Repairs shall be at no additional cost to the City of New York and all other agencies and entities.

3.10 WASTE MANAGEMENT

A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION 310900

SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract".

1.2 SUMMARY

A. Section includes all labor, materials, and equipment necessary for monitoring of groundwater levels, pump rates, and discharge volumes for all construction dewatering as shown on the Contract Drawings, as specified herein, and as required by the conditions at the site.

B. The work of this Section includes, but is not limited to the following:

1. Collect groundwater samples required for obtaining all necessary regulatory permits pertaining to groundwater control.
2. Obtain all necessary permits required for execution of the work of this Section.
3. All other labor, equipment, and materials as may be reasonably inferred to be required to make the work under this Section complete.

C. Related Requirements:

1. Work governed by this Section, as shown or specified shall be in accordance with the requirements of the Contract Drawings and the New York City Building Code (2014 edition). Examine the Contract Drawings for requirements that directly affect or are affected by work under this Section. A list of those documents and sections include, but is not limited to the following:

a. Section 033000 "Cast-in-Place Concrete"
b. Section 310000 "Earthwork"
c. Section 310900 "Geotechnical Instrumentation and Monitoring of Earthwork"
d. Section 315000 "Excavation Support and Protection"
e. Section 316616 "Special Foundation Walls"

1.3 STANDARDS, REFERENCES, AND REGULATORY REQUIREMENTS

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to specifications, standards and other reference documents cited in this Section and/or noted in the Contract Drawings.

B. All Work under this Section shall conform to the most restrictive requirements of the New York City Building Code (2014 edition).

C. Geotechnical Engineering Study. See Appendix. Boring and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between borings. The City of New York will not be responsible for interpretation conclusions drawn from this data by the Contractor.

D. The Contractor shall procure and pay for all permits and licenses required to complete the work of this Section, including fees for disposal of groundwater into New York City sewers.

E. The Contractor shall meet NYCDEP Limitations for Effluent, NYSDEC and EPA limitations for discharge into any surface water bodies, federal EPA and State Department of Transportation regulations for shipping of regulated substances to off-site disposal facilities, and meet all regulatory requirements imposed by the Treatment, Storage and Disposal Facility. Regulations pertaining to the transport and disposal of regulated substances/materials include, but are not limited to the following:

1. Department of Transportation 49 CFR 172 through 179
2. Department of Transportation 49 CFR 387 (46 FR 30974)
3. Department of Transportation DOT-E 8876
4. Environmental Protection Agency 40 CFR 136 (41 FR 52779)
5. Environmental Protection Agency 40 CFR 262 and 761
6. Resource Conservation and Recovery Act (RCRA)
7. NYCDEC, Rules of the City of New York (RCNY), Title 15, Chapter 19, Use of the Public Sewers.
8. NYCDEP, Limitations for Effluent to Sanitary or Combined Sewers.
9. NYCDEP, Dewatering Sampling and Testing Requirements

F. Any transporter of contaminated/hazardous materials shall be licensed in the state of New York.

G. Comply with OSHA (Occupational Safety and Health Administration) Standards and Regulations contained in Title 29 CFR Part 1910.120 "Hazardous Waste Operations and Emergency Response."

H. Where reference is made to one of the above standards the revision in effect at the time of construction shall apply.

I. In case of conflict between regulations and specifications, the Contractor shall comply with the most stringent requirements outlined in the specifications.

J. Nothing in clause 1.3 shall relieve the Contractor of their responsibility of providing a higher standard in order to comply with this Specification.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

1.5 QUALITY CONTROL

A. Materials and work shall conform to the latest edition of reference standards specified herein.

B. The Contractor shall evaluate the groundwater conditions resulting from excavation of soils and bedrock. The Contractor shall evaluate recharge potential of groundwater seepage including but not limited to pumping tests.

C. Groundwater control systems shall be capable of operating on a continuous basis throughout excavation and foundation construction. The Contractor shall provide adequate backup systems in the event of equipment failure or malfunction.

D. The Contractor's groundwater control system shall be capable of maintaining dry stable subgrade conditions.

E. The Contractor's groundwater control system shall consider methods and measures necessary to reduce inflow through soils or fissures in rock including but not limited to grouting and installation of pumping wells in an effort to minimize daily discharge quantities.

F. The Contractor's work shall not result in damage to adjacent property. Protect adjacent property from the effects of groundwater lowering, as required.

G. The Contractor shall record groundwater monitoring data.

H. The Contractor shall meet minimum qualifications as defined in Section 1.6.

1.6 QUALIFICATIONS

A. The Contractor performing the work of this Section shall be one specializing in groundwater control including methods to reduce inflow and in the installation and operation of groundwater control equipment. Submit evidence substantiating a minimum of three years satisfactory experience in the installation and maintenance of such systems. The Contractor shall designate a superintendent responsible for oversight of all groundwater control operations.

B. The Contractor shall retain the services of a Professional Engineer licensed in the State of New York. The Professional Engineer shall design the groundwater control system. The Professional Engineer must have three years of field and analytical experience with similar groundwater control operations.

1.7 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions, Section 013300 "Submittal Procedures".

1.8 ACTION SUBMITTALS

A. The Contractor shall submit the Professional Engineer's calculations, plans, and details of the groundwater control system to the Commissioner for review.

B. The Contractor shall submit a method statement for the evaluation of soil permeability, and any field testing to evaluate groundwater recharge.

C. Submit logs of soils encountered during drilling of any observation or test wells installed of the Contractor's own accord. Drilling logs should be submitted within 2 days of completion of the installation.

D. Submit field pumping test results to the Commissioner within 2 days of completion of field tests, as required.

E. Submit shop drawings and manufacturer's literature, and show and describe proposed groundwater control system, general arrangement procedures to be used, method of installation, materials, equipment, methods of treatment and disposal of pumped water, emergency action plans, and procedures for deactivating the system. Proposed procedures and methods of disposal of water shall prevent damage to existing structures, roadways and utilities. Shop drawings and literature should be submitted to the Commissioner a minimum of 20 working days prior to mobilization.

F. Submit working drawings and details section, show any installed observation wells and method of maintaining for any additional monitoring undertaken by the Contractor. Working drawings and details should be submitted to the Commissioner a minimum of 20 working days prior to mobilization.

G. Submit any related sheeting and bracing shop drawings in accordance with the requirements of Section 315000, "Excavation Support and Protection".

H. Submit approved water disposal discharge permit (if applicable) and evidence of applicable fee payment a minimum of 10 days prior to start of pumping.

1.9 FIELD CONDITIONS

A. Subsurface Conditions: The subsurface conditions within the development area are generally characterized by uncontrolled fill overlying medium dense to dense granular soils with interspersed layers of silt and clay. Groundwater was measured at a depth of about 30 feet below grade (about el 22 ft). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Study report.

B. Boring logs are available for the Contractor's review. The City of New York makes no predictions or representations regarding the character or extent of soil, or other subsurface conditions to be encountered during the Work. The Contractor shall make their own deductions of the subsurface conditions which may affect the methods.

C. The Contractor, by careful examination, shall inform themselves as to the nature and location of the work; the conformation of the ground, the nature of the subsurface conditions; the locations of the groundwater table; the character, quality and quantity of the materials to be encountered; the character of the equipment and facilities needed preliminary to and during the execution of the Work; and all other matters which can in any way effect the work.

D. The Contractor shall be held to have visited the site and to have familiarized themselves with the existing conditions of adjoining properties, utilities, and buildings.

E. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the work.

F. The Contractor shall become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area and beneath the surrounding streets. Contractor shall not damage any of those that are to remain and shall leave them accessible and make the necessary provision by sheeting, hanging, supporting, or other means necessary to obtain this result, subject to the approval of the Commissioner, NYCDOB, NYCDOT, and the utility companies involved.

G. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the City of New York and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.

H. Interruption of Existing Utilities: Do not interrupt any utilities serving facilities occupied by the Commissioner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Commissioner's written permission.

I. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.

J. Examine the Contract Drawings to determine the sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.10 PERMITS

A. Apply for and obtain required permits.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Contractor shall submit all details and other supporting data for materials proposed for use in performing groundwater control operations. All proposed materials shall be of a type acceptable to the Commissioner.

B. Equipment proposed for use in groundwater control operations shall be of a type acceptable to the Commissioner shall be installed in such a manner that it does not interfere with the operations of work specified under other Sections.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for "Execution Requirements".

3.2 GENERAL REQUIREMENTS

A. Coordinate location of wells, header pipes, and manifolds, if applicable, as required.

B. Collect and provide all necessary laboratory testing of groundwater samples for the purpose of obtaining regulatory permits.

C. Perform an evaluation of the groundwater conditions including elevations, permeability rates, and potential for groundwater fluctuations. The Contractor's design shall account for local geology and shall be capable of effectively controlling groundwater as necessary to achieve the proposed subgrade elevations. The Contractor's groundwater control system shall be capable of maintaining the site in the dry and maintaining stability of subgrades, excavations, and slopes.

D. The Contractor shall take any measures necessary to decrease groundwater flow, including but not limited to grouting, prior to excavation proceeding. The efficacy of all methods to reduce groundwater inflow shall be evaluated in the field based on observed conditions.

E. The groundwater control system shall be installed for the purpose of dewatering the below grade excavation to a depth of at least 2 feet below the bottom of proposed excavation, or as required to provide a "dry" stable construction site.

F. The groundwater control system must be kept in full operation as required by the Commissioner until adequate measures are in place to resist hydrostatic pressure. This may include the period of excavation, foundation and waterproofing installation.

G. The Contractor shall monitor and report groundwater levels outside the excavation and shall provide all monitoring results to the Commissioner for review.

3.3 DRAINAGE AND PUMPING

A. It is the responsibility of the Contractor to furnish, operate, and maintain sufficient drainage and pumping facilities to control groundwater within the site so that the excavation can proceed while maintaining stability of excavation support and stabilization systems.

B. Typically, the groundwater must be depressed at all times to at least 2 feet below the excavated ground surface, or as required to provide a stable excavation.

C. Prior to the start of excavation, the Contractor shall prepare and submit to the Commissioner their groundwater control plans, including procedures for initial pump tests, and shall not proceed until they are approved. Subsequently, the groundwater control plans are to be adjusted as necessary to accomplish the above listed goals and other requirements in this section.

D. The Contractor shall protect all monitoring locations. Contractor shall be responsible for all costs incurred to repair or replace monitoring equipment damaged as a result of the Contractor's activities.

E. Discharge of the pumped water must be performed in strict accordance with the Erosion and Sediment Control Plan.

F. Pumped water must be held in a settling tank prior to discharge to NYCDEP sewers. Dewatering manufacturer's system must be capable of removing suspended solids such that discharge does not exceed NYCDEP limit of 350 ppm total suspended solids (TSS).

G. The dewatering system shall be installed and operated in such a manner as to avoid the movement of fines or loss of ground from below the bearing level and shall not influence the stability of surrounding areas. Ensure that no fines are removed by the dewatering system. The collector shall be placed at a location approved by the Commissioner.

3.4 CLEANING, PROTECTION, AND ADJUSTMENT

A. The Contractor shall patch, repair, or replace any existing improvements, or work of other Sections, damaged or cut by work of this Section, subject to approval by the Commissioner.

B. At termination of activities, the Contractor shall remove from the site all equipment and installations of the groundwater control system.

END OF SECTION 312319

SECTION 312500 – SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract (City of New York Standard Construction Contract).

1.2 SUMMARY

A. Work includes:

1. Provide all labor, materials, equipment and services to implement all erosion and sediment control practices and procedures as indicated in the Contract Documents.
2. Inspect and maintain all erosion and sediment control practices weekly, prior to anticipated rainfall events, and after rainfall events. Needed restorations shall be made immediately.

B. Related Sections

1. Section 310000 - Earthwork

C. This Technical Specification is only applicable for General Fill or Rock. Excavated Fill material, which is not general fill, has additional requirements for cover, removal and time limits for placement.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 “Submittal Procedures”.

B. All calculations and shop drawings shall be signed and sealed by a Professional Engineer licensed in the State of New York and submitted to the Commissioner for review

1.4 ENVIRONMENTAL REQUIREMENTS

A. Protect adjacent properties and water resources from erosion and sediment damage throughout construction in accordance with the Soil Erosion and Sediment Control Plan and NYSDEC standards. The Contractor shall be responsible for administering the Plan.

B. Discharge from dewatering operations shall not be directed to surface waters. Discharge from dewatering operations shall be per DDC General Conditions.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 “Quality Requirements”.

1.6 REFERENCES

A. New York State Department of Environmental Conservation (NYSDEC) Standards and Specifications for Erosion and Sediment Control, latest revision.

B. United States Department of Environmental Protection Agency (EPA) Document No. EPA 832/R-92-005, "Storm Water Management for Construction Activities", Chapter 3, latest revision.

C. New York City Building Code, 2014 edition.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store materials in designated areas and as recommended by the manufacturer to protect against the elements, direct exposures, and damage.

B. Furnish erosion control blankets, jute mesh and geotextile fabric in rolls with suitable wrapping to protect against moisture and extended ultraviolet exposure prior to placement.

PART 2 - PRODUCTS

2.1 SILT FENCE

A. Silt fence posts: wood, steel, or an approved synthetic material, with a minimum length of three (3) feet. Hardwood posts shall have a minimum cross sectional area of 3.5 square inches. Steel posts shall be standard T and U sections weighing not less than 1.00 pounds per linear foot.

B. Silt fence fabric: Fabric shall meet or exceed the following specifications:

PROPERTY	UNIT	TEST METHOD	MIN. ACCEPTABLE VALUES
Grab Tensile Strength	lbs.	ASTM D4632	110
Elongation at Failure	%	ASTM D4632	20
Puncture Strength	lbs.	ASTM D4833	60
Mullen Burst Strength	PSI	ASTM D 3786	300
Flow Through rate	(gal./min.sf)	ASTM D 4491	25
Equivalent Opening Size		US Std. Sieve ASTM D 4751	40-80
Ultraviolet Radiation Stability	%	ASTM D 4355	70

C. Wire Fence: Minimum 14 gage with a maximum six inch mesh opening.

2.2 STRAW BALE DIKE

A. Hay or straw bales: New straw that shall be either wire bound or nylon string tied.

B. Bale stakes: Rebar, steel pickets, or 2-inch x 2-inch hardwood stakes.

2.3 STABILIZED CONSTRUCTION ENTRANCE

A. Stone aggregate: 1-inch to 4-inch clean stone or reclaimed or recycled concrete.

B. Geotextile: woven or non-woven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties shown:

PROPERTY	UNIT	TEST METHOD	Light duty Roads Grade Subgrade	Heavy duty Haul Roads Rough Graded
Grab Tensile Strength	lbs.	ASTM D1682	200	220
Elongation at Failure	%	ASTM D1682	50	60
Puncture Strength	lbs.	ASTM D751	40	125
Mullen Burst Strength	PSI	ASTM D3786	190	430
Equivalent Opening Size		US Std. Sieve CW-02215	40-80	40-80
Aggregate Depth	(inches)	-	6	10

C. Light duty roads: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multiaxle truck. Subject to compliance with requirements, products that may be incorporated into the Work include the following:

1. Trivera Spunbound 1115
2. Mirafi 100X
3. Typar 3401
4. Or approved equal.

D. Heavy duty roads: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Subject to compliance with requirements, products that may be incorporated into the Work include the following:

1. Trevira Spunbound 1135
2. Mirafi 600X
3. Typar 3801
4. Or approved equal.

2.4 FILTER FABRIC INLET PROTECTION

A. Filter Fabric: Fabric shall be a woven polypropylene geotextile and sewn by a double needle machine using a high strength nylon thread. Fabric shall be manufactured to fit the drainage inlet.

PROPERTY	UNIT	TEST METHOD	MIN. ACCEPTABLE VALUES
Grab Tensile Strength	lbs.	ASTM D4632	110
Grab Elongation	%	ASTM D4632	10-15
Puncture Strength	lbs.	ASTM D4533	900
Trapezoidal Tear	lbs.	ASTM D4533	65-90
Flow Through rate	(gal./min.sf)	ASTM D 4491	66
Equivalent Opening Size	US Sieve	ASTM D 4751	30
Ultraviolet Radiation Stability	%	ASTM D 4355	96
Permittivity	sec-1	ASTM D-4491	0.862

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Review site conditions and Contract Drawings prior to the commencement of demolition, earth moving activities or excavation.

B. The Contractor shall notify the Commissioner prior to the commencement of work. Any proposed deviation from the Contract Drawings must be submitted to the Commissioner in writing 72 hours prior to commencing work.

C. Install erosion and sediment controls for each work area prior to commencement of work within that work area. Comply with NYSDEC standards and specifications.

D. Perform all erosion and sediment controls in accordance with the Contract Drawings.

3.3 SILT FENCE

A. Silt Fence shall be placed as close to disturbed area as possible, but at least 10 feet from the toe of a slope steeper than 3H:1V. The area beyond the fence must be undisturbed or stabilized. The type of silt fence specified for each location on the plan shall not exceed the maximum slope length and maximum fence length requirements shown in the following table:

Slope	Steepness	Slope Length/Fence Length (ft.) Standard	Slope Length/Fence Length (ft.) Reinforced	Slope Length/Fence Length (ft.) Super
<2%	< 50:1	300/1500	N/A	N/A
2-10%	50:1 to 10:1	125/1000	250/2000	300/2500
10-20%	10:1 to 5:1	100/750	150/1000	200/1000

20-33%	5:1 to 3:1	60/500	80/750	100/1000
33-50%	3:1 to 2:1	40/250	70/350	100/500
>50%	> 2:1	20/125	30/175	50/250

B. Maximum allowable slope length and fence length will not exceed the limits shown in the Design Criteria for the specific type of silt fence used; Maximum allowable ponding depth of 1.5 feet behind the fence. Given that erosion would occur in the form of sheet erosion and there is no concentration of water flowing to the barrier; Soil conditions allow for proper keying of fabric, or other anchorage, to prevent blowouts.

C. Locate silt fence at the toe of slopes and at ground level throughout its length. Drive posts securely at least 16-inches into the ground on the down slope side of the trench. Set post spacing a maximum of ten (10) feet apart. Adjust spacing to place posts at low points along fence line.

D. Fasten support wire fence to upslope side of posts, extending six inches below grade. Attach continuous length of fabric to upslope side of fence posts. Avoid joints, particularly at low points in the fence line. Fasten fabric securely to support posts where joints are necessary and overlap to the next post. Place the fabric in the trench so the bottom folds across the bottom of the trench.

E. Inspect silt fences weekly and after each rainfall event. Remove any sediment deposits found promptly to provide adequate storage volume for the next rain and reduce pressure on the fence. Do not undermine the silt fence during clean out. Replace fabric that is torn, decomposed, or in any way becomes ineffective, immediately without additional expense to the City of New York.

F. In addition to procedure summarized above, refer to installation and service requirements outlined in the Contract Drawings.

3.4 STRAW BALE DIKE

A. Use straw bale dikes subject to the following conditions:

1. Slope Steepness 2H:1V - Maximum Length 25-ft
2. Slope Steepness 3H:1V - Maximum Length 50-ft
3. Slope Steepness 4H:1V - Maximum Length 75-f

B. Do not exceed ¼ acre drainage area for overland flow per 100-feet of straw bale dike with silt fence, with maximum ponding depth of 1.5 feet behind the fence. Given that erosion would occur in the form of sheet erosion and that there is no concentration of water flowing to the barrier.

C. Excavate the area to accommodate placement of straw bales which are to be embedded in the soil a minimum of four inches, and placed so the string or wire is horizontal. Place bales in a row with ends tightly abutting the adjacent bale. Anchor the bales securely by driving two stakes or rebar through each bale to a minimum depth of 1.5 to 2 feet into the ground. Drive the first stake in each bale toward the previously laid bale to force the bales together. Drive stakes flush with the top of the bale.

D. Inspect straw bales weekly and after each rainfall event, restore or replace promptly as needed. Remove accumulations of sediment trapped by straw bale filters regularly. Remove temporary straw bales from the site at the conclusion of construction. Restore the areas where the straw bales were installed to match the surrounding area. Restoration may include, but is not limited to, seeding and establishing the lawn area.

E. In addition to procedure summarized above, refer to installation and maintenance requirements outlined in the Contract Drawings.

3.5 STABILIZED CONSTRUCTION ENTRANCE

A. Install stabilized construction entrances at any point where traffic will be entering or leaving a construction site to or from a public-right-of–way, street, alley, sidewalk, or parking area.

B. Install and maintain a minimum stone thickness of 6-inches.

C. The stabilized construction entrance width shall be twelve feet minimum but not less than the full width of points of where ingress or egress occurs. The stabilized construction entrance shall be a minimum width of 24-feet if there is only one entrance to the site.

D. The length of the stabilized construction entrance shall be 50-feet minimum.

E. Place geotextile over the entire area to be covered with aggregate.

F. Provide piping of surface water under entrance as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

G. Maintain the entrance in a condition which will prevent tracking of sediment onto public-right-of-way or streets. This may require periodic top dressing with additional aggregate. Remove all sediment spilled, dropped, or washed onto public right-of-way immediately.

H. Clean wheels, when required, to remove sediment prior to entrance onto public right-of-way. Perform washing, when required, on an area stabilized with aggregate, which drains into an approved sediment trapping device. Prevent all sediment from entering storm drains, ditches and watercourses.

I. In addition to procedure summarized above, refer to installation and maintenance requirements outlined in the Contract Drawings.

3.6 FILTER FABRIC INLET PROTECTION

A. Install inlet protection at all existing, temporary, and new catch basins located within the disturbed work area.

B. Space support stakes evenly around the inlet a maximum of three (3) feet apart. Drive support stakes a minimum of 18-inches below grade. Bridge spans greater than three (3) feet with the use of wire mesh behind the filter fabric for support.

C. Drive support stakes close to the inlet so any overflow drops into the inlet and not on the unprotected soil.

D. Cut filter fabric from a continuous roll to eliminate joints. Overlap joints, if needed, to the next stake. Extend filter fabric a minimum of one (1) foot below grade and backfill. Securely fasten fabric to the support stakes and frame.

E. Do not extend filter fabric more than 1.5 feet above the inlet crest unless reinforced.

F. Install wooden frame completely around the crest of the fabric for overflow stability.

G. Inspect the fabric barrier after each rain event and restore as needed. Remove sediment from the pool area as necessary with care not to undercut or damage the filter fabric.

H. In addition to procedure summarized above, refer to installation and maintenance requirements outlined in the Contract Drawings.

3.7 TEMPORARY STOCKPILE

A. Secure PVC sheeting in place with tie downs and/or weights such as sand bags at the end of each workday and during adverse weather conditions.

B. Construct stockpiles so that the height does not exceed fifteen (15) feet. Side slopes shall not be steeper than 2H:1V.

C. Contain all stockpiles with hay bales and silt fence placed continuously around the perimeter.

D. Apply temporary seeding to all stockpiles which will be inactive for twenty (20) days or longer.

E. Maintain stockpiles in accordance with DDC General Conditions and NYCDEP regulations.

F. In addition to procedure summarized above, refer to installation and maintenance requirements outlined in the Contract Drawings.

3.8 EROSION CONTROL IMPLEMENTATION

A. Place erosion control systems in accordance with the staging and features outlined in the Contract Drawings.

B. Follow construction phasing in the sediment control plans to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations.

C. Incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls.

D. Properly construct, stabilize, and maintain all temporary and permanent erosion and sedimentation control measures and related items.

1. Perform general inspection of sediment and erosion controls at end of each work day, and assure that controls are in good condition before leaving.
2. Perform detailed inspection of all sediment and erosion controls at least once every seven days and within 24 hours after each rainfall of more than one half (0.5) inch.
3. Perform any needed maintenance and restorations, and add measures as needed to control erosion and sediments.
4. Remove accumulated sediments from sediment traps and behind silt fences before they reach 50% of capacity. Dispose of sediments in upland area, stabilized to prevent further erosion or sedimentation.
5. Maintain written records of all inspections, maintenance and restorations, and submit copies of the written reports to the Commissioner at the end of each month of work.

E. Replace at own expense any control measure that is not functioning properly as directed by the Commissioner.

F. Install inlet protection on all new catch basins immediately upon construction of catch basins.

G. Implement dust control measures during construction. Minimize dust clouds by watering down construction area or other approved methods as required.

H. Secure a tarp over materials in all construction vehicles hauling materials either into or out of the construction area to prevent sediment pollution of public roadways.

I. Design erosion and sediment controls specific to the site in accordance with the NYSDEC Standards, which are more stringent than the EPA Standards.

3.9 NON-STORMWATER DISCHARGE CONTROLS

A. Groundwater encountered within excavations shall be disposed per DDC General Conditions.

B. Cleaning water for construction vehicles and equipment shall be diverted to the temporary and approved erosion and sediment control measures. Chemicals and detergents shall not to be used.

C. Coordinate with the Commissioner to identify areas on-site for construction vehicle transit (i.e. – haul roads, contractor trailers and parking areas, etc.) or equipment staging which shall be monitored and where runoff can be controlled.

D. Water used for dust control measures shall be applied using appropriate quantities and equipment. No chemical additives shall be used.

E. Water main flushings, hydrostatic test water, fire test water, and chlorination test water shall be directed to the control measures on the site. Turbid water is to be detained to allow sufficient sedimentation time (minimum of 24 hours). Chlorinated water is to be detained until the water is de-chlorinated (minimum of 24 hours).

F. Concrete trucks shall be washed out in an area approved of by the Commissioner. Designate wash-out areas with proper signage. Locate a concrete wash-out box near the concrete trucks to prevent concrete residue from being washed off-site. Wash-out containers can be pre-fabricated or constructed on-site out of plywood and plastic sheeting. All runoff from wash-out activities shall be directed to the on-site control measures. Discarded cementitious materials shall be removed and disposed off-site.

G. Building washing or parking lot cleaning water (where no spills or leaks of toxic or hazardous materials have occurred) that may enter the storm drainage system shall not contain chemicals or detergents.

3.10 REMOVALS

A. Maintain erosion and sediment control devices within each work area until final stabilization of that work area.

B. "Final stabilization" shall mean that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

C. Remove erosion and sediment control devices in accordance with the DDC General Conditions.

END OF SECTION 312500

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes temporary excavation support and protection systems and all labor, materials, equipment, and accessories necessary for the completion of all shoring, bracing, and support work as shown on the Contract Drawings, as specified herein, and as required by the conditions at the project site.

B. The work of this Section includes, but is not limited to the following:

1. All professional engineering, surveying, layout, monitoring, and submittals in connection with the work in this Section.
2. Design of all temporary support of excavation (SOE) systems and any temporary bracing of existing foundation structures or utilities required.
3. Installation of sheeting, bracing, and soil support necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of support and movement.
4. Perform exploratory test pits to determine the locations and conditions of existing adjacent utilities.
5. Protection and monitoring of streets and utilities.
6. Maintenance of excavation support and bracing.
7. Monitoring of adjacent buildings and structures, as required.
8. Monitoring of excavation support systems, as required.
9. Removal of excavation support and bracing, as required.
10. Other labor and materials as may be reasonably inferred to be required to make the work under this Section complete.

C. Related Requirements:

1. Provide excavation support in accordance with the requirements of the Contract Drawings and the New York City Building Code (2014 edition).
2. The City of New York has retained a Geotechnical Engineer to prepare and obtain New York City Department of Buildings (DOB) approval for support of excavation (SOE) design drawings for the project. The Contractor shall retain a Professional Engineer licensed in the State of New York to replace the Geotechnical Engineer as design applicant in DOB TR-1 forms for SOE work. The Contractor's licensed Professional Engineer shall prepare signed and sealed SOE design drawings necessary to facilitate the proposed new construction and to properly support all adjacent buildings, structures, sidewalks, streets, yards, and utilities. The Contractor shall not be allowed to commence any SOE work, nor excavation requiring SOE to be in place, prior to receipt of DOB approval for the submitted SOE drawings.

3. Examine the Contract Drawings for requirements that directly affect or are affected by the work under this Section. A list of those documents and sections include, but is not limited to the following:

   a. Section 033000 "Cast-in-Place Concrete"
   b. Section 310000 "Earthwork"
   c. Section 310900 "Geotechnical Instrumentation and Monitoring of Earthwork"
   d. Section 312319 "Dewatering"
   e. Section 316616 "Special Foundation Walls"

1.3 REFERENCES

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings.

B. All Work under this Section shall conform to the most restrictive requirements of the New York City Building Code (2014 edition).

C. Where more stringent, the following codes, standards, and specifications (latest edition), shall apply to the Work of this Section, all as modified herein or by the above mentioned New York City Building Code:

   1. Building Code Requirements for Structural Concrete, ACI 318
   2. Specification for Structural Steel Buildings, ANSI/AISC 360
   3. Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7
   4. Design Load on Structures During Construction, ASCE 37
   5. Structural Welding Code - Steel, ANSI/AWS D1.1
   6. Structural Welding Code - Reinforcing Steel, ANSI/AWS D1.4
   7. Post Tensioning Institute (PTI) Recommendations for Prestressed Soil and Rock Anchors, PTI DC35.1-14.

D. Geotechnical Engineering Study. See Appendix. Borings and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between borings. The City of New York will not be responsible for interpretation or conclusions drawn from this data by the Contractor.

E. ASTM (American Society for Testing and Materials) Specifications cited in the reference standards, New York City Building Code (2014 edition), this Specification or in cited reference documents shall be the year of adoption or tentative adoption and revision listed in the latest edition of the Annual Book of ASTM Standard, "Index", except that, should a specific year of adoption or revision be cited by the Contract Documents, by New York City Building Code (2014 edition), or be proposed by the Contractor and accepted by the Commissioner, that edition shall apply to and control the Work.

F. American Association of State and Highway Transportation Officials (AASHTO) Publications.

G. The Contractor shall comply with the most stringent requirements outlined in the specifications.

H. Nothing in clause 1.3 shall relieve the Contractor of their responsibility of providing a higher standard in order to comply with this Specification.

1.4 DESIGN CRITERIA

A. Support of excavation and bracing shall be designed to accommodate the loading from existing conditions and construction operations. Loads shall include, but not be limited to, soil pressure, hydrostatic pressure, and surcharges from structures, stored materials, and equipment (stationary or moving).

B. Support of excavation and bracing systems shall be designed to prevent progressive failure in the event of damage or failure of any individual element.

C. Support of excavation and bracing shall be designed to limit ground movement, movement or damage of existing structures and utilities, ground loss, fluctuation in groundwater levels resulting from construction activities, and stress increases that may negatively affect existing structures, infrastructure, or utilities.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Prior to work on site, the Commissioner will arrange a series of meetings to discuss coordination and scheduling. Parties to be present: Testing Laboratory, Excavation Contractor, Commissioner, Special Inspector(s), and any other parties deemed necessary by the Commissioner. Review the earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least three (3) working days prior to convening conference. Record discussions and agreements and furnish a copy of meeting minutes to each participant.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions, Section 013300 "Submittal Procedures".

1.7 ACTION SUBMITTALS

A. Product Data:

1. For all proposed materials, include product data, relevant laboratory testing, construction details, material descriptions, performance properties, and dimensions of individual components and profiles, calculations for excavation support and protection system, and all other relevant information.

B. Plans and Shop Drawings:

1. Where the Contractor elects to modify the design from that indicated on the Contract Drawings or is directed to assume design responsibility by the Commissioner, the Contractor shall prepare and submit shop drawings and calculations for all support of excavation, rock stabilization and support, underpinning, and bracing systems to be implemented under this Section at least 30 days before beginning work.
2. All shop drawings and calculations shall be signed and sealed by a Professional Engineer licensed in the State of New York.

3. Shop drawings shall include all necessary notes, plans, elevations, sections, and details to clearly depict the various portions of the work, material types, and methods of installation, and coordination with the work of other trades.
4. Show arrangement, locations, and details of soldier piles, piling, lagging, tiebacks, bracing, and other components of excavation support and protection system according to engineering design relative to property lines, existing structures, and proposed structures.
5. Include sections depicting assumed subsurface profile, including natural groundwater conditions and any anticipated draw down conditions resulting from dewatering operations.
6. Fully detail all connections, including welds, bolting, anchorages, or other means of connection.
7. Indicate type and location of waterproofing.
8. Include a written plan for excavation support and protection, describing all systems, assumptions, requirements for materials and installation, and including sequence of construction of support and protection coordinated with progress of excavation.
9. Include all requirements for pre-loading, post-tensioning, and load testing.
10. Include all necessary notes pertaining to required special inspections and materials testing.
11. Shop drawings shall be referenced to the North American Datum of 1983 (NAD83) for horizontal control and the North American Vertical Datum of 1988 (NAVD88) for vertical control.
12. Shop drawings shall show all design loads (including surcharge loads from cranes and other equipment, buildings, adjacent structures, stored materials, etc.).
13. Shop drawings shall be to scale and shall be dimensioned.
14. Shop drawings shall be coordinated with the project Monitoring Plan. The shop drawings shall include any requirements for monitoring not detailed on the monitoring plan or included in the requirements of Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

C. Engineering Services Submittal: For excavation support and protection systems, including analysis data signed and sealed by the qualified professional engineer, licensed in the state of New York, responsible for their preparation.

1.8 INFORMATIONAL SUBMITTALS

A. The Contractor's Professional Engineer licensed in the State of New York shall prepare an outline of the Contractor's construction methods and step-by-step procedures together with plans and details of the excavation support system to satisfy the New York City Building Code (2014 edition) requirements and approved drawings. This shall be coordinated with relevant submittals identified in this Section and shall be submitted and reviewed by the Commissioner for concept before submittal of the shop drawings.

1. Detailed calculations shall be provided for all support of excavation, rock stabilization and support, underpinning, and bracing systems implemented under this Section.
2. Calculations shall list all references.
3. Calculations shall include all details of subsurface profiles, soil design parameters, groundwater levels, and loading conditions (surcharges, etc.).
4. Calculations shall detail all assumptions made.
5. Calculations shall fully illustrate all equations utilized and shall note the reference used for each equation. Where spreadsheets are provided, they shall be accompanied by sample calculations illustrating the equation utilized in each cell.
6. Calculations shall detail all materials, element sizes, lengths, spacing, and construction sequence, and any requirements for pre-loading and/or post-tensioning.
7. Calculations shall detail all connections.

8. Calculations shall provide an estimate of deflections and settlement for all support elements, the adjacent ground, and adjacent structures.

B. Monitoring Program: Monitoring shall be as per Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork.

C. Existing Conditions: Using photographs, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.
1. The Contractor may perform, if they wish, their own conditions verification survey and shall submit any findings that differ from the Commissioner's documentation as specified herein at least 15 days before beginning the work.

D. Certification for Examination of Site and Records: Before proceeding with the Work, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, existing adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports, the Contract Drawings.

E. Procedures and methods to be used to ensure safety and stability of all adjacent structures, as well as identification of the entity that will sign the DOB TR-forms as the responsible party for the Structural Stability of adjacent buildings.

1.9 CLOSEOUT SUBMITTALS

A. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.10 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

B. Contractor Qualifications: The Contractor performing the Work of this Section shall demonstrate that they have at least three years of recent field experience on projects of similar size, scope, and complexity.

C. Design Supervision: Where applicable, the Contractor shall retain the services of a Professional Engineer licensed in the State of New York who shall design and supervise installation of all SOE, shoring, and bracing. The Contractor's Professional Engineer shall sign and submit all relevant forms for regulatory filings.

D. Surveying and Monitoring: Engage and assign survey monitoring work of this Section to a Professional Land Surveyor licensed in the State of New York. The results of all monitoring work performed by the Contractor shall be made immediately available to the Contractor's Professional Engineer responsible for the design supervision of the work specified herein and the Commissioner.

E. Codes and Permits:

1. Comply with the New York City Building Code (2014 edition).
2. All labor, materials, equipment, and services necessary to make the work comply with such requirements shall be provided without additional cost to the City of New York.

3. The Contractor shall procure and pay for all permits and licenses required to complete the work of this Section.

1.11 QUALITY CONTROL

A. Special Engineering Inspection:

1. The City of New York shall engage, under the requirements of Section 1704.1 of the New York City Building Code (2014 edition), one or more Special Inspection Agencies to observe installation and provide all necessary material testing related to the Work of this Section. All inspections and all necessary materials testing shall be by Special Inspectors meeting the minimum qualifications outlined in RCNY 101-06.
2. Observation of excavation, sheeting, and shoring and bracing installation shall be performed on a full-time basis. Inspections associated with materials testing shall be made on a periodic basis, as required, as the work progresses.
3. The Special Inspector(s) for installation and materials testing shall log the applicable work and prepare records of daily activities. This shall not relieve the Contractor's responsibility to provide any component or system capable of meeting the requirements outlined on the Contract Drawings and as specified herein.
4. The Special Inspector(s) shall prepare and submit daily reports summarizing the installation and/or material testing activities. The Special Inspector(s) shall prepare records including: items completed each day; name of key personnel performing the work; job and weather conditions; equipment used; detailed construction logs for each element installed, including locations, materials, configuration, dimensions, unusual conditions or other observations; and other general quantities; materials testing; load tests, etc. The Contractor shall cooperate and assist the Special Inspector(s) in the making of these records.
5. Where work is observed to be non-conforming, the Special Inspector(s) shall immediately inform the City of New York of such conditions in writing. A summary of the observed non-conformance shall be issued within 24 hours. The Special Inspector(s) shall maintain a tracking log of all non-conformances and shall update the tracking log on a daily basis such that corrective measures, if required, can be facilitated in a timely fashion. The tracking log shall include such information as ID number, date opened, description of non-conformance, actions required, actions taken, and date closed.
6. The Special Inspector(s) shall submit all field logs and test reports necessary to facilitate any corrective design requirements.
7. The Special Inspector(s) shall provide all necessary certifications of the Work in compliance with New York City Building Code (2014 edition) requirements.

B. The Contractor shall have the sole responsibility for coordinating their work to assure that all tests and inspection procedures required by the Contract Drawings and the New York City Building Code (2014 edition) are properly provided by the Special Inspector(s). The Contractor shall cooperate fully with the Special Inspector(s) in the performance of their work.

C. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be performed at the expense of the City of New York, as required by the Special Inspector(s).

D. Retesting of rejected materials and installed work shall be the Contractor's responsibility and shall be performed at their expense.

E. The Contractor shall notify the Commissioner and all other necessary parties at least 72 hours prior to each day of support of excavation installation to allow for the appropriate personnel to be on site.

F. The role of the Special Inspector(s) shall not relive the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Drawings.

1.12 FIELD CONDITIONS

A. Subsurface Conditions: The subsurface conditions within the development area are generally characterized by uncontrolled fill overlying medium dense to dense granular soils with interspersed layers of silt and clay. Groundwater was measured at a depth of about 30 feet below grade (about el 22 ft). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Study report.

B. The Contractor, by careful examination, shall inform themselves as to the nature and location of the work; the conformation of the ground, the nature of the subsurface conditions; the locations of the groundwater table; the character, quality, and quantity of the materials to be encountered; the character of the equipment and facilities needed preliminary to and during the execution of the Work; and all other matters which can in any way affect the work.

C. The Contractor shall be held to have visited the site and to have familiarized themselves with the existing conditions of adjoining properties, utilities, and buildings.

D. Borings are available for the Contractor's review. The City of New York makes no predictions or representations regarding the character or extent of soil, or other subsurface conditions to be encountered during the Work. The Contractor shall make their own deductions of the subsurface conditions which may affect the methods or cost of construction of the work hereunder. Additional borings and other exploratory operations may be performed by the Contractor, at the Contractor's option and expense, and following the Commissioner's approval.

E. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the Work.

F. The Contractor shall become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area and beneath the surrounding streets. Contractor shall not damage any of those that are to remain and shall leave them accessible and make the necessary provision by sheeting, hanging, supporting, or other means necessary to obtain this result, subject to the approval of the Commissioner, New York City Department of Buildings and Department of Transportation, and the utility companies involved.

G. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the City of New York and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.

H. Interruption of Existing Utilities: Do not interrupt any utilities serving facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Commissioner's written permission.

I. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.

J. Examine the Contract Drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.13 SURVEY AND MONITORING

A. Monitoring shall be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork", and the requirements set forth herein.

B. Survey Work: Engage a qualified land surveyor or professional engineer licensed in the state of New York to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks, and record existing elevations.

C. Before starting work, the Contractor's New York State licensed Professional Engineer and Land Surveyor shall check and verify governing dimensions and elevations, survey conditions of adjoining structure, and record any prior settlement or cracking of structures, and other improvements.

D. The Contractor shall be responsible for monitoring of excavation support systems, adjacent buildings, and other structures as outlined on the Contract Drawings. The Contractor shall be solely responsible for monitoring of existing buildings, structures, excavation support, etc.

E. The Contractor shall install monitoring points (i.e. for ground movement, vibration, etc.) to adequately monitor and otherwise keep informed of the conditions during the work.

1.14 ERRORS IN DEPTH

A. In the event that any part of the excavation is carried, through error, beyond the depth and the dimensions indicated on the Contract Drawings or called for in the specifications, then the Contractor, at their own expense, shall furnish and install gravel, stone, or concrete fill with which to fill to the required level at all locations, subject to the approval of the Commissioner.

1.15 PROTECTION

A. The Work shall be executed so that no damage or injury will occur to the existing public and adjacent structures, streets, paving, sewers, gas, water, electric, or any other pipes. Should any damage or injury caused by the Contractor, or anyone in the Contractor's employ, or by the Work under this Contract occur, the Contractor shall, at their own expense, restore such damage and shall assume all responsibility for such injury.

B. The above shall also include the protection of all existing utilities (including sewers, water lines, electrical lines, and telecommunication lines) to remain in use within and adjacent to the area affected by the Work of this project.

C. Monuments, benchmarks, and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, replace them at no additional expense to the City of New York.

D. Excavation sides, adjacent structures, and foundations shall be protected by means of adequate bracing, shoring, and anchoring at all times. Excavation shall not proceed until adequate support for excavation sides is provided. Contractor is solely responsible for the stability, safety, and protection of excavation sides.

E. Provide barricades and warning lights and barriers to prevent accidents, to avoid all necessary hazards and protect the public, the Work, and property at all times, including Saturdays, Sundays, and Holidays.

F. Provide protection to sidewalks and pedestrians as required.

G. Erosion and Sediment Control and dust control shall be in accordance with the Contractor's Site Management Plan.

H. Earthwork shall be in accordance with Section 310000, "Earthwork".

I. Monitoring shall be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

J. The Contractor shall maintain the cleanliness of paved streets immediately adjacent to the site through regular sweeping and moistening as required to remove any excess mud, dirt, or rocks tracked from the site. Materials shall be covered with a tarpaulin during transport offsite.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York as defined in DDC General Conditions, to design excavation support and protection systems to resist all lateral loading and surcharge, including but not limited to, retained soil, groundwater pressure, adjacent building loads, adjacent traffic loads, construction traffic loads, material stockpile loads, and seismic loads, based on the following:

1. Compliance with OSHA Standards and interpretations, 29 CFR 1926, Subpart P.

2. Compliance with AASHTO Standard Specification for Highway Bridges or AASHTO LRFD Bridge Design Specification, Customary U.S. Units.
3. Compliance with utility company requirements.
4. Compliance with railroad requirements.

2.2 MATERIALS

A. Materials for use in support of excavation, soil stabilization and support, and bracing systems shall be suitable to withstand loads imposed without unintended movement. Materials shall be kept in serviceable condition at all times throughout the duration of excavation and foundation construction. Materials shall be suitable for a minimum design life of 5 years.

B. Structural Steel:

1. Structural steel W-shapes shall conform to ASTM A 992/A 992M, Grade 50, unless otherwise noted on the Contract Drawings.
2. All other structural steel shapes, plates, and sheet piles shall conform to ASTM A 572, Grade 50, unless otherwise noted on the Contract Drawings.
3. Miscellaneous steel shall conform to ASTM A 36, unless otherwise noted on the Contract Drawings.
4. Pipe for use in piles and bracing elements shall conform to the requirements of ASTM A 252, Grade 3, except that the yield strength shall be a minimum of 80 ksi, unless otherwise noted on the Contract Drawings.
5. Other structural steel materials are subject to the approval of the Commissioner.

6. Timber for guard rails shall be rough sawn, full size, construction grade lumber with a minimum allowable bending stress of 1,500 psi.
7. All other wood and timber for use of elements constructed under this section shall be comprised of Southern Pine No. 1 Dense with a minimum fiber bending stress (F_b) equal to 1,000 psi, a minimum fiber compression stress parallel to the grain (F_c) equal to 1,000 psi, and a minimum Young's Modulus (E_{min}) equal to 450,000 psi.
8. Other wood and timber materials are subject to the approval of the Commissioner.

C. Cast-in-Place Concrete:

1. Concrete shall have a minimum unconfined compressive strength at 28 days as shown on the Contract Drawings and shall meet the requirements of ACI 301.
2. Concrete shall meet the requirements outlined in Section 033000, "Cast-in-Place Concrete".
3. Other concrete materials are subject to the approval of the Commissioner.

D. Grout:

1. Grout shall consist of a fluid mixture of Portland Cement, fine aggregate (if required), admixtures (if required) and water capable of being pumped, and shall be proportioned to achieve the minimum unconfined compressive strength shown on the Contract Drawings.
2. Other grout materials are subject to the approval of the Commissioner.

E. Reinforcing Bars:

1. Standard steel reinforcing bars shall consist of deformed bars meeting the requirements of ASTM A 615/A 615M, Grade 60, unless otherwise noted on the Contract Drawings.
2. Reinforcing steel subject to welding shall consist of deformed bars meeting the requirements of ASTM A 706, Grade 60, unless otherwise noted on the Contract Drawings.
3. Plain welded wire fabric shall meet the requirements of ASTM A 185, unless otherwise noted on the Contract Drawings.
4. Tie wire shall be a minimum of 16-gauge and meet the requirements of ASTM A 82, unless otherwise noted on the Contract Drawings.
5. Other reinforcing bar materials are subject to the approval of the Commissioner.

F. Tiebacks:

1. Tieback tendons shall consist of single-corrosion protected hollow bars manufactured by Nucor Skyline Steel, Williams Form Engineering, Dywidag, or approved equal.
2. Other tieback materials are subject to the approval of the Commissioner.

2.3 DELIVERY, STORAGE, AND HANDLING

A. Materials ordered and delivered to the project site, before verification of element size and length, will be at the Contractor's risk.

B. After sizes and lengths are verified, the Contractor shall deliver materials to the project site in such quantities and at such times to assume continuity of operations to maintain the project schedule.

C. Materials shall be stored in orderly groups above ground and blocked during storage to minimize possible distortion of members.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for Execution Requirements.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

3.3 INSTALLATION - GENERAL

A. Excavation support and bracing shall be constructed in accordance with the New York City Building Code (2014 edition) requirements.

B. Notify the Commissioner before the start of work. The notifications are to be in accordance with the Contract Drawings.

C. The Contractor shall provide, erect, and maintain all necessary support of excavation, soil stabilization and support, and bracing when and where required. Locate excavation support and protection systems clear of permanent construction, so that construction and finishing of other work is not impeded.

D. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Provide alternate routes around closed or obstructed traffic ways if required.

E. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

F. Support of excavation, soil stabilization and support, and bracing shall be erected and maintained to permit excavation to the required foundation subgrade and to the satisfaction of the Commissioner. Systems on which the support or stability of existing structures is dependent shall be left in place following completion of the work. In other areas, maintain system until elements are replaced by other bracing or until permanent construction is capable of resisting all imposed loading.

G. The construction and performance of the support of excavation, soil stabilization and support, and bracing work for the purpose of which it is erected shall be the entire responsibility of the Contractor.

H. Should any subsidence or any other damage occur, the damage shall be made good by the Contractor at their own expense.

I. The Contractor shall make use of such methods of work as are best adapted to preserve the safety and stability of foundations, walls, and other parts of affected buildings or structures.

J. During the excavation of work specified in Section 310000, "Earthwork", if additional locations may require sheeting and bracing based on the Contractor's construction methods and procedures, then provide such additional supports at no additional cost to the City of New York. Such additional supports shall be designed and constructed in accordance with the requirements of this Section, as per the Contract Drawings.

K. Dewatering, if required, shall be in accordance with the requirements of Section 312319, "Dewatering". Such dewatering shall be considered part of the excavation and/or underpinning operations.

L. All work shall be carried on in such a manner as not to interfere with the progress of the work under this Contract.

M. Excavation support and bracing shall not be removed where it may impact the stability of new construction or that of adjacent structures, infrastructure, or utilities.

N. Materials that affect or impede finished construction shall be removed. Removal of such materials shall be performed such that no loss of support occurs to adjacent structures, infrastructure or utilities. Any material left in place must be removed to a depth not less than 5 feet below finished grade. Materials removed from the excavation shall be immediately removed from the site and properly disposed.

O. Where support of excavation and bracing is required to withstand earth pressures resulting from backfill placement, the backfill shall not be placed until after the system is complete and suitable to accommodate such loading conditions.

3.4 SOLDIER PILES AND LAGGING

A. Soldier piles and lagging shall be designed and constructed in accordance with the New York City Building Code (2014 edition).

B. Soldier piles and lagging shall be adequate to resist earth and hydrostatic pressures and lateral pressures due to surcharge loads, to prevent displacement of adjacent ground; and to prevent loss of support or damage to buildings, utilities, sidewalks and streets. Lateral loads created from adjacent buildings, cranes, and/or street loads shall be included in the design.

C. Members shall be of adequate size and adequate lateral bracing shall be provided to meet design standards for allowable stresses and factors of safety for temporary construction.

D. Install steel soldier piles before starting excavation.

1. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement.
2. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging.
3. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

E. Install wood lagging within flanges of soldier piles as excavation proceeds.

1. Trim excavation as required to install lagging.
2. Fill voids behind lagging with soil, and compact.

F. Install lateral support and bracing at locations indicated on Drawings and secure to soldier piles.

G. Excavation adjacent to the soldier piles and lagging shall not exceed a depth of 2 feet below the point of lateral support and bracing to be installed, unless specifically designed to accommodate additional unbraced excavation depths. Lateral support shall be installed and preloaded as required prior to continuing excavation.

3.5 SHEET PILING

A. Sheet piling shall be designed and constructed in accordance with the New York City Building Code (2014 edition).

B. Sheet piling shall be adequate to resist earth and hydrostatic pressures and lateral pressures due to surcharge loads, to prevent displacement of adjacent ground; and to prevent loss of support or damage to buildings, utilities, sidewalks and streets. Lateral loads created from adjacent buildings, cranes, and/or street loads shall be included in the design.

C. Members shall be of adequate size and adequate lateral bracing shall be provided to meet design standards for allowable stresses and factors of safety for temporary construction.

D. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.

E. Accurately place the piling using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer.

1. Limit vertical offset of adjacent sheet piling to 60 inches.
2. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

F. Cut tops of sheet piling to uniform elevation at top of excavation.

G. Excavation adjacent to the sheet piling shall not exceed a depth of 2 feet below the point of lateral support and bracing to be installed, unless specifically designed to accommodate additional unbraced excavation depths. Lateral support shall be installed and preloaded as required prior to continuing excavation.

3.6 TIEBACKS

A. Drill, install, grout, and tension tiebacks.

B. Performance test at least 10 percent of the tieback elements to 133 percent of the design load.

C. Proof test all tiebacks that have not been performance tested. Proof test shall be performed to 133 percent of the design load.

D. The load schedule for proof tests and performance tests shall be in accordance with the Post Tensioning Institute (PTI), latest edition, recommended procedures and per the Contract Drawings.

E. The acceptance criteria for total movement and creep movement shall be in accordance with the PTI recommended limits and per the Contract Drawings.

F. Anchor lock-off loads shall be at least 80 percent of the anchor design load upon completion of testing. Tiebacks should be lifted-off to ensure that lock-off is within 5 percent of the lock-off value. If it is, the tieback can be locked off. If it is not, repeat the lock-off/lift-off test until within 5 percent of the assigned value.

G. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.7 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Commissioner.
2. Install internal bracing if required to prevent spreading or distortion of braced frames.

3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.8 MODIFICATIONS DURING CONSTRUCTION

A. The Commissioner shall direct modification of the design of support of excavation, soil stabilization and support, and bracing where necessary to address field conditions. System type or element size, length, orientation, and spacing shall be modified as required.

B. Any changes to the design shall be documented through sketches or plan revisions and shall be submitted for record. All sketches and revisions plans shall be signed and sealed.

3.9 UPKEEP

A. Monitor and maintain excavation support and protection system.

B. Prevent surface water from entering excavations by grading, dikes, or other means.

C. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

3.10 FIELD QUALITY CONTROL

A. Grout: Grout shall be sampled and tested by an independent Special Inspection Agency retained by the City of New York. The Contractor shall notify the Commissioner a minimum of 48 hours prior to required sampling. Sampling and Casing of a set of six 2-inch cubes or 3-inch diameter cylinders shall be performed for each batch. For each set, one sample shall be tested at 3 days, 7 days, and three cubes tested at 28 days. One sample shall be kept as a reserve in case of low grout strength results. If the 28-day sample breaks at a strength greater than or equal to the required, then the last sample shall also be tested at 28 days. If not, the last sample shall be tested at 56 days.

B. Concrete: Sampling and testing shall be in accordance with the Contract Drawings and Section 033000, "Cast-in-place Concrete".

C. Excavation Support and Underpinning: All excavation support and underpinning shall be subject to special inspection in accordance with the New York City Building Code (2014 edition).

D. Survey-Work Benchmarks: Resurvey benchmarks regularly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open.

1. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions.
2. Promptly notify Commissioner if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
3. All monitoring shall be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork", and the Contract Drawings.

E. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.

F. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.11 REMOVAL

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures.

1. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
2. Remove excavation support and protection systems to a minimum depth of 5 feet below overlying construction, and abandon remainder.
3. Fill voids immediately with approved backfill compacted to density specified in Section 310000, "Earthwork".
4. Repair or replace, as approved by Commissioner, adjacent work damaged or displaced by removing excavation support and protection systems.

3.12 CLEAN-UP

A. All excess material shall be removed from the site and legally disposed of.

B. All lumber, forms, and metal work shall be removed immediately after completion of local areas. The Contractor shall be responsible for removal of all debris produced by Work to this Section from the site.

C. Sidewalks and streets adjoining the property stall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the Work of this Section.

3.13 WASTE MANAGEMENT

A. Separate and dispose of waste in accordance with the project's Waste Management Plan.

END OF SECTION 315000

SECTION 316616 - SPECIAL FOUNDATION WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes permanent secant piles and all labor, materials, equipment, and services necessary for the complete work of installing drilled secant pile walls as shown on the Contract Drawings, as specified herein, and as required by the conditions at the project site.

B. The work of this Section includes, but is not limited to the following:

1. All labor, materials, equipment, and services necessary to perform all operations required for the complete work of installing drilled secant pile walls as indicated on the Contract Drawings and as specified herein.
2. Secant pile walls shall be comprised of alternating unreinforced concrete primary piles and reinforced concrete secondary piles with a defined diameter and overlap to form a continuous concrete wall. The diameters and overlap between primary and secondary piles shall be as shown on the Contract Drawings.
3. Secant piles shall include all sizes and configurations shown on the Contract Drawings. Where applicable, secant piles shall be constructed with soil or rock socket bond zones as shown on the Contract Drawings.
4. Design and testing of concrete mixes.
5. Submission of all required shop drawings, supporting data, mill certificates, and the like for cement, admixtures, aggregates, water, reinforcing steel, accessories, compounds, coatings, and the like.
6. Furnish all required temporary casing and concrete guide walls.
7. Furnish all falsework, cribbing, dunnage, etc. to provide safe access to secant pile locations.
8. Removal and legal disposal of excess drilling mud and spoils generated as part of the drilling process.
9. The Contractor shall facilitate monitoring of all structures and utilities in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".
10. Submission of installation logs.
11. Other labor and materials as may be reasonably inferred to be required to make the work under this Section complete.

C. Related Requirements:

1. Provide secant pile walls in accordance with the requirements of the Contract Drawings and the New York City Building Code (2014 edition).

2. Examine the Contract Drawings for requirements that directly affect or are affected by work under this Section. A list of those documents and sections include, but is not limited to the following:

   a. Section 033000 "Cast-in-Place Concrete"
   b. Section 310000 "Earthwork"
   c. Section 310900 "Geotechnical Instrumentation and Monitoring of Earthwork"
   d. Section 312319 "Dewatering"
   e. Section 315000 "Excavation Support and Protection"

1.3 STANDARDS, REFERENCES, AND REGULATORY REQUIREMENTS

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings.

B. All Work under this Section shall conform to the most restrictive requirements of the New York City Building Code (2014 edition).

C. All work and materials under this section shall conform to the latest revision of the following standard specifications, where not otherwise required by the Contract Documents.

D. The following publications form a part of this Specification to the extent indicated by the specific citations in other paragraphs of this Specification. In case of conflict, the particular requirements of this Specification shall govern, unless indicated otherwise.

   1. Field Reference Manual: Specifications for Structural Concrete, ACI 301, with Selected ACI and ASTM References, SP-l5. Contractor shall keep at least one full copy in the field office at all times.
   2. Building Code (2014 edition) Requirements for Structural Concrete (ACI 318-11) and Commentary (ACI 318R-11) referred to hereafter as ACI Code.
   3. Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, ACI 211.1.
   4. Guide for Measuring, Mixing, Transporting and Placing Concrete, ACI 304.
   5. Recommended Practice for Evaluation of Strength Test Results of Concrete, ACI 214.
   6. Structural Welding Code - Reinforcing Steel, ANSI/AWS D1.4.
   7. Structural Welding Code - Steel, ANSI/AWS D1.1

E. ASTM (American Society for Testing and Materials) Specifications cited in ACI 318, ACI 301, this Specification or in cited reference documents shall be the year of adoption or tentative adoption and revision listed in the latest edition of the Annual Book of ASTM Standard, "Index", except that, should a specific year of adoption or revision be cited by the Contract Documents, by Building Code (2014 edition), or be proposed by the Contractor and accepted by the Commissioner, that edition shall apply to and control the Work.

F. Geotechnical Engineering Study. See Appendix. Boring and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between borings. The City of New York will not be responsible for interpretation or conclusions drawn from this data by the Contractor.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions, Section 013300 "Submittal Procedures".

1.5 ACTION SUBMITTALS

A. At least two weeks prior to mobilization of any equipment or materials to the site, submit satisfactory proof of Contractor qualifications for performing the Work specified herein, and name of Contractor's Professional Engineer, licensed in the State of New York.

B. Shop Drawings:

1. Where the Contractor elects to modify the secant pile design from that indicated on the Contract Drawings, the Contractor must submit full design calculations and details prepared by a Professional Engineer, licensed in the State of New York. The Contractor's design shall meet the requirements of all applicable codes and specifications and shall be suitable for accommodating loading associated with the required excavation. Shop drawings shall be signed and sealed by the Contractor's Professional Engineer.
2. Submitted shop drawings shall indicate the following information:

a. Schedule of all applicable sizes and configurations;
b. Dimensions and clear distances to adjacent structures;
c. Dimensions and lengths of rock and/or soil sockets, where applicable;
d. Schedule of reinforcing steel with all applicable dimensions, weights, and grades of embedded steel shapes;
e. Diameter and thickness of temporary casing;
f. Details for installation;
g. Welding and splicing details, where applicable;
h. Load test setup and details, including load test location, loading schedules, instrumentation, load frames, etc.

C. Manufacturer's or supplier's documentation certifying that core beams and any other reinforcing steel conform to the requirements specified herein. This shall also include mill certificates covering physical and chemical tests. All material shall be delivered to the site with clear identification to link the materials to the certificates and tests.

D. Submit all concrete mix designs, laboratory test results, and supplier data. Concrete mix designs shall be prepared by a Professional Engineer, licensed in the State of New York.

E. Installation Equipment and Procedures:

1. The type of equipment for installation of secant piles, including but not limited to drill rig, proposed soil and rock drilling bits, drilling techniques, methods for passing obstructions, and temporary casing. Review of the drilling equipment does not relieve the Contractor from the responsibility of properly drilling secant piles (in consideration of any neighboring structures), in a satisfactory condition, to the specified criteria, to achieve the design capacities specified herein and shown on the Contract Drawings.

2. Installation procedures for the primary and secondary secant piles including but not limited to: detailed sequence of construction; drilling of any required pilot holes; advancement and extraction of temporary casing; drilling of rock and/or soil sockets (where applicable); cleaning of the secant pile boreholes prior to concreting; placement of concrete fill under tremie; and placement of reinforcing steel in secondary piles.
3. Methodology to maintain the proper vertical axis of secant piles during drilling.
4. Methodology for identifying and clearing obstructions including any pre-drilling, pre-excavation and associated backfilling including proposed backfill materials.
5. Methods for advancing the rock and/or soil socket and removing spoils.
6. Methods for cleaning the bottom of the rock and/or soil socket.
7. Methodology for maintaining a stable bottom during drilling including use, type and estimated quantity of any mineral (i.e., bentonite) or polymer slurry products.
8. Methodology to stabilize the borehole during drilling in the event that bottom heave or running sands are observed including temporary backfilling procedures and materials.
9. Submit all materials data and procedures for the splicing of core beams and other reinforcing steel.
10. Submit detailed description of the tools and procedures for use in tremie placement of concrete.
11. Submit resumes and certifications for all welders to perform the Work.
12. Method of handling and disposal of drilling fluid and drilling spoils in compliance with soil management requirements.
13. Methods to fill any gaps between adjacent pile members

F. Secant Pile Identification Plan:

1. A plan clearly showing the designation and location of all secant piles by an identification system, location plan shall be referenced to the Foundation Drawings. The plan shall include the location of the centerline of each secant pile referenced to a known benchmark and orientation for the purposes of setting out.
2. All detailed records for individual secant piles shall bear identification corresponding to that shown on the identification plan. A copy of this plan shall also be available at the site for inspection at all times. The identification plan shall be signed and sealed by a Professional Engineer licensed in the State of New York, and shall be provided in electronic and hard copy formats.

G. Provide all necessary details for guide walls or jigs to maintain the top alignment and overlap spacing of secant piles.

H. As-built Survey: Where requested by the Commissioner, provide as-built survey of secant pile walls showing actual plan location of members relative to property boundaries and adjacent structures.

1.6 PROFESSIONAL ENGINEERING

A. When a modification to the design is elected, the Contractor shall submit the New York State licensed Professional Engineer's calculations, plans, and details, as specified herein, to the Commissioner for review.

1.7 FIELD CONDITIONS

A. Subsurface Conditions: The subsurface conditions within the development area are generally characterized by uncontrolled fill overlying medium dense to dense granular soils with interspersed layers of silt and clay. Groundwater was measured at a depth of about 30 feet below grade (about el 22 ft). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Study report.

B. The Contractor's means and methods shall account for the possibility of obstructions being encountered during drilling (including but not limited to remnant foundations, temporary support of excavation elements and rubble fill), and necessity to maintain strict adherence to the requisite tolerances for both plan location and verticality (plumbness). In all cases, the Contractor shall take necessary measures to establish and maintain the proposed centerlines at the cut-off elevation, and plumbness of the excavation.

C. Borings are available for the Contractor's review. The City of New York makes no predictions or representations regarding the character or extent of soil, rock, or other subsurface conditions to be encountered during the Work. The Contractor shall make their own deductions of the subsurface conditions which may affect the methods or cost of construction of the work hereunder. Additional borings and other exploratory operations may be performed by the Contractor, at the Contractor's option and expense, and following the Commissioner's approval.

D. The Contractor, by careful examination, shall inform themselves as to the nature and location of the work; the conformation of the ground and the nature of the subsurface conditions; the locations of the groundwater table; the character, quality and quantity of the materials to be encountered; the character of the equipment and facilities needed prior to and during the execution of the work; and all other matters which can be in any way effect the work.

E. The Contractor shall be held to have visited the site and to have familiarized themselves with the existing conditions of adjoining properties, utilities, and buildings.

F. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the Work.

G. The Contractor shall become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area and beneath the surrounding streets. Contractor shall not damage any of those that are to remain and shall leave them accessible and make the necessary provision by sheeting, hanging, supporting, or other means necessary to obtain this result, subject to the approval of the Commissioner, NYCDOB, NYCDOT, and the utility companies involved.

H. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the City of New York and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

I. Interruption of Existing Utilities: Do not interrupt existing utilities serving facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Commissioner's written permission.

J. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.

K. Examine the Contract Drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.8 PROTECTION

A. The work shall be executed so that no damage will occur to the existing public and adjacent structures, streets, paving, sewers, gas, water, electric or any other pipes. Should any damage caused by the Contractor, or anyone in Contractor's employ, or by the Work under this Contract occur, the Contractor shall, at their own expense, repair such damage.

B. The above shall also include the protection of all existing utilities (including sewers, water lines, electrical lines, and telecommunication lines) to remain in use within and adjacent to the area affected by the Work of this project.

C. Monuments, benchmarks and other reference features on streets bounding this project, shall be protected. Should these be disturbed in any manner, replace them at no additional expense to the City of New York.

D. While performing work of this Section, or any other related Section, the Contractor shall take care that their operations do not adversely affect the stability and integrity of existing buildings and structures in the vicinity, or induce settlement in them.

E. Excavation sides, adjacent structures, and foundations shall be protected by means of adequate bracing, shoring, and anchoring at all times. Excavation shall not proceed until adequate support for excavation sides is provided. The Contractor is solely responsible for the stability, safety, and protection of excavation sides.

F. The responsibility for any damage to buildings, structures, utilities, sidewalks, pavement, and other facilities in the vicinity resulting from the Contractor's operations will be entirely theirs, and they shall take whatever measures are necessary to prevent the same. Should damage occur due to work under this Section, all costs in connection with the repair of such damage and the restoration of damaged construction to its original condition shall be borne by the Contractor.

G. Provide barricades and warning lights and barriers to prevent accidents, to avoid all necessary hazards and protect the public, the Work, and property at all times, including Saturdays, Sundays, and Holidays.

H. Provide protection to sidewalks and pedestrians as required.

I. Erosion and Sediment Control and dust control shall be in accordance with the Contractor's Site Management Plan.

J. Earthwork shall be in accordance with Section 310000, "Earthwork".

K. Support of excavation shall be in accordance with Section 315000, "Excavation Support and protection".

L. Monitoring shall be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

M. The Contractor shall maintain the cleanliness of paved streets immediately adjacent to the site through regular sweeping and moistening as required to remove any excess mud, dirt, or rocks traced from the site. Materials shall be covered with a tarpaulin during transport offsite.

1.9 SURVEYING AND MONITORING

A. Monitoring shall be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork", and the requirements set forth herein.

B. The Contractor shall retain, at their own cost, a land surveyor licensed in the State of New York to perform all necessary field layout, monitoring, and to document as-built conditions.

1.10 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

B. Source Quality Control: The Contractor's material control procedures shall be effective and shall assure that all Work fulfills the requirements of the project as well as the applicable provisions of the Contract Drawings.

C. Codes and Permits:

1. Comply with the New York City Building Code (2014 edition).
2. All labor, materials, equipment and services necessary to make the Work comply with such requirements shall be provided without additional cost to the City of New York.
3. The Contractor shall procure and pay for all permits and licenses required to complete the Work of this Section.

1.11 QUALITY CONTROL

A. Special Engineering Inspection:

1. The City of New York will engage, under the requirements of Section 1704.1 of the New York City Building Code (2014 edition), one or more Special Inspection Agencies to observe installation and provide all necessary material testing related to the Work of this Section. All inspections and all necessary materials testing shall be performed by Special Inspectors meeting the minimum qualifications outlined in RCNY 101-06.
2. Secant pile installation shall be observed on a full-time basis by the Special Inspector(s). The Contractor shall arrange for Special Inspector(s) to be on the site during installation to verify that elements are installed in accordance with design requirements and to perform any requisite materials testing. A minimum of 72 hours notice shall be provided to the Special Inspector(s) by the Contractor.

3. The Special Inspector(s) shall prepare and submit daily reports summarizing the construction and/or material testing activities to the City of New York for review.
4. The Special Inspector(s) shall prepare and submit installation logs and test reports necessary to facilitate any corrective design requirements.
5. The Special Inspector(s) shall keep detailed records, including items completed each day, job and weather conditions, a log of each element drilled with soil or rock strata encountered, water entry and flow, drilling difficulties, fluid loss, obstructions, casing size and location, bottom cleanout and water removal, description of bearing material, depth and size of shaft, plumbness, location of center of secant pile with respect to design location (survey by the Contractor), top elevation (survey by the Contractor), placement of steel reinforcement, size of reinforcement, location and types of splices for reinforcement, concreting, and any other pertinent construction details. These records shall be provided to the Commissioner.
6. When a suitable bottom is presumably reached in each secant pile, it shall be determined by the Special Inspector(s) if the socket length is suitable and the bottom is suitably cleaned. Before placement of concrete, the socket and any casings shall be thoroughly cleaned. Cleaning with buckets, water flush and/or air lift shall be performed, as required.
7. The Special Inspector(s) shall document all welding performed for steel reinforcement. These records shall be provided to the Commissioner on a daily basis.
8. Where work is observed to be non-conforming, the Special Inspector(s) shall immediately inform the City of New York of such conditions in writing. A summary of the observed non-conformance shall be issued within 24 hours. The Special Inspector(s) shall maintain a tracking log of all non-conformances and shall update the tracking log on a daily basis such that corrective measures, if required, can be facilitated in timely fashion. The tracking log shall include such information as ID number, date opened, description of non-conformance, actions required, actions taken, and date closed.
9. The Special Inspector(s) shall submit all field logs and test reports necessary to facilitate any corrective design requirements.
10. The Special Inspector(s) shall provide all necessary certifications of the Work in compliance with New York City Building Code (2014 edition) requirements.

B. Concrete Placement and Testing:

1. With respect to concrete filling, the Special Inspector(s) will (with the Contractor's assistance) verify that the actual volumes of concrete placed into the piles are within the established acceptable criteria.
2. Concrete testing shall be as required in Section 033000, "Cast-in-place Concrete", and as specified herein. Concrete testing shall be performed by the Special Inspector(s). At a minimum, six concrete cylinders shall be obtained per 50 cubic yards of concrete placed; at least six cylinders shall be obtained for each day of concrete placement. The samples shall be tested in accordance with ASTM C 109.

C. The Contractor shall have the sole responsibility for coordinating their work to assure that all tests and inspection procedures required by the Contract Drawings and the New York City Building Code (2014 edition) are properly provided by the Special Inspector(s). The Contractor shall cooperate fully with the Special Inspector(s) in the performance of their work.

D. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be performed at the expense of the City of New York, as required by the Special Inspector(s).

E. Retesting of rejected materials and installed work shall be the Contractor's responsibility and shall be performed at their expense.

F. The Contractor shall notify the Commissioner and all other necessary parties at least 72 hours prior to each day of required inspection to allow for the appropriate personnel to be on site.

G. The role of the Special Inspector(s) shall not relieve the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Drawings.

1.12 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Prior to work on site, the Commissioner will arrange a series of meetings to discuss coordination and scheduling. Parties to be present: Testing Laboratory, Secant Pile Contractor, Commissioner, and the Special Inspector(s). Agenda to include: size and capacity of equipment used; review of boring and groundwater data; special inspection procedures and reporting format; safety measures to be followed; groundwater control; soil spoils and management plan and requirements. Notify participants at least three working days prior to convening conference. Record discussions and agreements and furnish a copy of meeting minutes to each participant.

1.13 DAILY PLANNING MEETING

A. The Commissioner shall arrange for daily site meetings with the Special Inspector(s), the Contractor, and any other relevant parties to review all proposed work before the start of each shift.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Minimum sizes and quantities of all steel reinforcement shall be as shown on the Contract Drawings.

1. Structural steel reinforcement: Hot-rolled wide flange sections shall conform to ASTM A 992, Grade 50. The natural mill camber of wide flange sections shall not exceed 1/8-inch per 10 feet. All members shall be full length or spliced using complete joint penetration (CJP) welds.
2. Plates shall conform to ASTM A 572, Grade 50.

B. Longitudinal reinforcing bars shall conform to ASTM A 615, Grade 75.

C. Transverse reinforcing bars shall conform to ASTM A 615, Grade 60.

D. Tie-wire: 16 gauge or heavier, black annealed wire conforming to ASTM A 82.

E. Shear studs shall conform to ASTM A108/A29, Grade C1010 to C1020.

2.2 TEMPORARY STEEL CASING

A. Temporary steel casings shall be suitable for achieving the required secant pile diameters shown on the Contract Drawings.

B. Temporary steel casing shall be round and free of defects and shall be of suitable quality pipe meeting ASTM 252 Grade 3. All casings shall be suitable for accommodating the torque and crowd forces developed by drilling equipment (drill rigs and oscillators). Segmental double wall casing shall be used where directed by the Commissioner.

C. The lead section of temporary casings shall be fitted with appropriate shoes to facilitate drilling.

2.3 CONCRETE

A. Contractor furnished concrete mixes shall be in accordance with Section 033000, "Cast-in-place Concrete".

B. Concrete shall have a minimum 28-day unconfined compressive strength as indicated on the Contract Drawings.

C. Source Changes: Should the source of an ingredient change, for any of the concrete products specified herein, Contractor shall redesign the affected mix and shall resubmit all prior to incorporating such material into the work.

2.4 WELDING MATERIALS

A. All welding materials shall be consistent with the requirements of the metals to be welded.

B. Welding materials shall be stored to prevent contamination and degradation of electrodes, filler, or shielding materials as per the Manufacturer's specifications.

2.5 INSTALLATION EQUIPMENT

A. Provide equipment, machinery, tools, and other apparatus for drilling, digging, pumping, and hauling. Provide ample standby equipment to prevent flooding, distortion, or caving so that work may be carried on without interruption.

B. Provide adequate lighting to permit clear sight conditions in all work and access areas.

C. Provide hoisting equipment of sufficient capacity to handle casing, reinforcing steel, and other materials.

D. Provide sufficient equipment to completely clean bottom prior to concreting and reinforcement installation.

E. Provide hoses of sufficient size and strength, grout pump, and connections required to perform tremie concrete placement. Provide temporary rubber plugs necessary to prevent mixing of water and concrete in the tremie pipe.

2.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the project site in such quantities and at such times to assure the continuity of secant pile drilling operations, and to maintain the project schedule. Carefully handle secant pile materials by means of rope slings or other means so as not to damage the materials.

B. Casings and reinforcement shall be stored in orderly groups above ground, sufficiently blocked to minimize bending stresses. Material exhibiting variations beyond specified limits shall be considered distorted and shall not be used in the work. Casing and reinforcement shall each have unique identification tags confirming material lot number and origin.

C. Concentrated loads, which occur during stacking or lifting, shall be kept below the level that would produce permanent deformation or overstress of the material. Damaged material will be rejected from use in the performance of the work and shall be removed from the site.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for Execution Requirements.

3.2 PREPARATION

A. Notify the Commissioner before the start of work. The notifications are to be in accordance with the Contract Drawings.

B. Install all necessary protection equipment, structures such as fences, signs, scaffolding, etc. before the start of work.

C. Remove all existing structures, utilities, pavement in accordance with the Contract Drawings.

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during secant pile installation operations. Shore, support, and protect utilities encountered.

D. Perform test pits alongside each of the adjacent buildings to determine the extent and depth of the below-grade space and the foundation type.

3.3 FIELD STAKEOUT

A. Secant piles (including guide walls or jigs) shall be staked out in the field by a Land Surveyor licensed in the State of New York. The Contractor and the Commissioner shall meet on-site to review the proposed secant pile locations and discuss any necessary modifications before drilling commences.

3.4 SEQUENCING AND SCHEDULING

A. Secant pile installation shall be sequenced as shown on the Contract Drawings.

B. Secondary piles should not be drilled until concrete in primary piles has set and attained a minimum compressive strength of 500 psi.

C. Secant pile construction shall be a continuous uninterrupted process between excavation, placement of reinforcement (where required), concrete placement, and extraction of temporary casing.

D. Concrete shall be placed within 2 hours after placement of reinforcement, unless otherwise approved by the Commissioner.

3.5 DRILLING, CONCRETEING, AND PLACEMENT OF REINFORCEMENT

A. The Contractor shall drill all secant piles of specified sizes to required depths. The methods of construction shall be as specified herein, but the Contractor shall be solely responsible for the adequacy of all operations.

B. Drilling equipment shall have adequate torque capacity and crowd force capacity for the site conditions to install the secant piles to the required depth. Selection of equipment and tooling shall be the sole responsibility of the Contractor. All equipment and tooling shall be maintained in good operating condition.

C. Temporary casing shall be advanced ahead of the drill stem, and a soil plug of at least 2 feet shall be maintained until the casing has advanced to the required secant pile tip elevation. Drilling fluids, including but not limited to, water, mineral slurry, or polymer slurry shall be provided where necessary to maintain a stable bottom throughout drilling. All methods employed shall be as described in the Contractor's method statement.

D. The Contractor's drilling methods shall prevent inflow of soils from beyond the shaft limits (i.e., running sands, etc.) which can result in erosion, destabilization, and subsidence.

E. The Contractor shall advance rock and/or soil sockets to the minimum required depth and diameter shown on the Contract Drawings.

F. As soon as the required depth is reached the Contractor shall clean the bottom of all loose material, and notify the Special Inspector(s), who will record the actual bottom depth.

G. After the shaft bottom has been inspected and approved by the Special Inspector, reinforcing shall be placed (secondary piles) or the shaft shall be filled immediately with concrete (primary piles).

H. Reinforcing steel shall be clean and free of foreign matter that may adversely affect bond. All reinforcing shall be centralized within the shaft and the minimum cover shown on the Contract Drawings shall be maintained. Steel shall be braced temporarily as required to facilitate making any required field splices and to maintain reinforcement in a suitable alignment.

I. Concrete shall be continuously placed by methods that avert segregation and dislodging of excavation sidewalls and shall completely fill the shaft. Concrete shall be placed by tremie unless otherwise approved by the Commissioner. The discharge shall be kept a minimum of 6 feet below the fresh concrete surface during placement. Concrete shall be pumped until fresh concrete is observed to be continuously discharging from the top of the secant pile.

J. Concrete shall be placed within 2 hours after installing the reinforcing steel unless otherwise approved by the Commissioner.

K. Drilling of new secant piles shall not be permitted within 10 feet of concrete that has not cured for at least 12 hours, unless otherwise approved by the Commissioner.

L. Concrete shall be placed using underwater tremie techniques only after water flow has stabilized.

M. A rubber plug or other temporary separation device shall be utilized to prevent mixing of water and concrete in the tremie pipe. Tremie pipes shall be removed from the secant pile following concrete placement unless otherwise approved by the Commissioner.

N. Reinforcing steel shall be centralized and braced as necessary to remain within proper alignment until concrete has set.

O. Temporary casing shall be removed while concrete is plastic. Withdrawal of the temporary casing should be performed in a controlled manner to prevent disturbance and/or necking of concrete and movement of any reinforcing steel.

P. During drilling operations, all openings shall be properly protected and covered when work is not in progress. Suitable lights and barricades shall be provided as required.

3.6 LOAD TESTING

A. The secant pile bond zone shall be confirmed by load test. The load test shall be conducted on a sacrificial test pile installed outside the limits of the proposed secant pile wall at a location selected by the Contractor in consultation with the Commissioner. The test pile shall not be installed at any location that will create a conflict with new construction. The test pile shall be installed per the notes in the Contract Drawings.

B. The test pile shall be instrumented with vibrating wire sister bar strain gauges at the locations shown in the Contract Drawings.

C. Testing shall include one successful compression load test in accordance with the New York City Building Code (2014 edition) and ASTM D 1143 (quick load test procedure).

D. Loading, testing, and recording of data shall be under the full time inspection of the Special Inspector(s). The Contractor shall independently monitor and record all pertinent data.

E. The hydraulic jack shall be equipped with the necessary gauges and piping which shall transmit constant load to the sacrificial test pile. The apparatus for applying the vertical load shall be as given in ASTM D 1143. The sacrificial test pile shall have been concreted in place a minimum of 7 days before load testing. Concrete strength shall have achieved strength per the Contract Drawings prior to sacrificial test pile load testing.

F. Measurements:

1. Measure sacrificial test pile settlements with at least three (3) linear variable differential transducer (LVDT) gauge heads and at least (3) dial gauges capable of reading to the nearest 0.001 inch. Travel for all gauges shall be at least 3 inches. Dial gauges shall be mounted on an independent steel test frame to prevent relative movement during the load test.
2. Establish a separate mirror, wire, scale set-up, with scale capable of measuring to the nearest 0.02 inch.
3. Provide independent survey level measurements of the sacrificial test pile using optical level survey equipment capable of reading to the nearest 0.005 ft.

G. Results and acceptance of the test pile are subject to review and approval of the Commissioner.

3.7 MONITORING

A. General:

1. Monitoring of surrounding structures and utilities shall be performed in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

B. Verticality:

1. Inclination of the casing shall be checked prior to initiation of drilling using a plumb bob or digital level. The plumbness measurement shall be provided to the Special Inspector(s) prior to commencing with drilling. Initial deviation from vertical shall not be greater than 1 percent prior to proceeding with drilling.
2. The inclination of the temporary casing shall be checked at intervals not to exceed 30 feet during drilling to ensure that deviations are within acceptable tolerances in accordance with the Contractor's approved method statement and procedures.

3.8 TOLERANCES

A. Top elevations shall be within 1-inch of ground surface outside the excavation or as shown on the Contract Drawings.

B. Shafts shall be drilled within 1% of plumb.

C. Shafts shall be within 1-inch of the minimum diameter as indicated on the Contract Drawings, unless otherwise approved by the Commissioner.

D. Maximum permissible deviation of center of top of any pile from required location at the ground surface shall be 1-inch.

E. Maximum permissible deviation of the center of the core beam from the as-built center of the secant pile shall be 1-inch. Core beams shall be oriented with flanges parallel to the wall alignment with no more than 5 degrees of misalignment.

F. Maximum permissible deviation of rebar cages from the as-built center of the secant pile shall be 1-inch. Distribution and placement of rebar shall meet the standard tolerances described in ACI 318-11.

G. The Contractor shall be responsible for all costs associated with review of any calculations for corrective construction by the Commissioner.

H. Approvals: The Special Inspector(s) will make final approval of secant pile shaft holes and authorize subsequent concrete placement.

3.9 CLEAN-UP

A. All excess material shall be removed from the site and legally disposed of.

B. All debris resulting from excavation and drilling, removal of obstructions, cut-off butts, and any material not to remain as part of the construction shall be removed immediately after completion of local areas. The Contractor shall be responsible for removal of all debris produced by work of this Section from the site.

C. The site shall be cleaned at frequent intervals and no material shall be stored on the site in a manner which would obstruct the easy access of equipment and personnel. Stockpiling of material will not be permitted.

D. Sidewalk and streets adjoining the property shall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the Work of this Section.

3.10 WASTE MANAGEMENT

A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION 316616

SECTION 320110 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. The Work of this Section Includes: General protection, removal, and pruning of existing trees that are affected by execution of the Work, whether temporary or permanent construction, and as shown on the Contract Drawings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.5 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials for the Work, including tree protection, must conform to the NYCDOT and NYCDPR Standard Specifications, as applicable, and latest revisions and bulletins.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 TREE PROTECTION

A. Trunk Protection: Protect the trunk of each tree to remain as follows:

1. Install wood planks around trunk perthe NYCDOT and NYCDPR Standard Specifications, as applicable, and latest revisions and bulletins.

3.4 PROTECTION ZONES

A. Maintain protection zones free of weeds and trash.

B. Maintain hydration of plants to assure plant survival.

C. Maintain protection-zone fencing and signage in good condition as acceptable to Commissioner and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by the Commissioner if a root buffer effective against soil compaction is constructed as directed by the Commissioner. Maintain root buffer so long as access is permitted.

3.5 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones in accordance with requirements in Section 310000 "Earthwork" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

3.6 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction per NYCDOT and NYCDPR Standard Specifications, as applicable, and latest revisions and bulletins.

3.7 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches per NYCDOT and NYCDPR Standard Specifications, as applicable, and latest revisions and bulletins..

3.8 CORRECTIVE WORK AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by NYCDOT and NYCDPR..

END OF SECTION 320110

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes: Asphalt Pavement for roadways in the public right-of-way as shown on the Contract Drawings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product

B. Design Mixtures: For each asphalt mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials for the Work including concrete materials, mixtures, formwork, reinforcement, joints, and detectable warning materials must conform to the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.

B. Proof-roll subgrade below pavements per the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins

C. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Commissioner, and replace with compacted backfill or fill as directed.

3.4 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement per the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins

3.5 PATCHING

A. Asphalt Pavement: Asphalt patching must conform to the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins

CORRECTIVE WORK

B. Corrective work must conform to the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins

3.6 FIELD QUALITY CONTROL

A. Special Inspections: The City of New York will engage an independent testing agency to perform BPP-11 inspections and issue reports as per the requirements of the NYC Building Code.

B. Concrete paving will be considered defective if it does not pass tests and inspections.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 SURFACE PREPARATION

A. Ensure that prepared subgrade has been proof-rolled and is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course. Construction joints installation must conform to the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins

3.9 COMPACTION

A. General: Compaction must conform to the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins.

3.10 INSTALLATION TOLERANCES

A. Pavement Surface Smoothness: Compact each course per NYCDOT Standard Specifications, as applicable, latest revisions.

3.11 WASTE HANDLING

A. General: Handle asphalt-paving waste according to approved waste management plan. Comply with DDC General Conditions

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the City of New York Standard Construction Contract.

1.2 SUMMARY

A. Section includes: Steel faced concrete curbs, sidewalks, and roadways in the public right-of-way as shown on the Contract Drawings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 “Submittal Procedures”.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 “Quality Requirements”.

1.6 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials for the Work including concrete materials, mixtures, formwork, reinforcement, joints, and detectable warning materials must conform to the NYCDOT Standard Specifications, as applicable, and latest revisions and bulletins.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proceed with installation only after unsatisfactory conditions have been corrected per the requirements of the NYCDOT Standard Drawings and Specifications.

3.3 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.4 INSTALLATION

A. All concrete paving work including curbs, sidewalks, and roadways in the public right-of-way must be installed at the locations as shown on the Contract Drawings and must conform to the NYCDOT Standard Drawings and Specifications.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: The City of New York will engage an independent testing agency to perform BPP-11 inspections and issue reports as per the requirements of the NYC Building Code.

B. Concrete paving will be considered defective if it does not pass tests and inspections.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 CORRECTIVE WORK AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Commissioner.

B. Drill test cores, where directed by Commissioner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Stone pavers.

B. Related Requirements:

1. Section 044200 "Exterior Stone Cladding."
2. Section 072000 "Thermal Insulation."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For materials other than water and aggregates.
2. For the following:

    a. Pavers.
    b. Mortar and grout materials.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquids in tightly closed containers protected from freezing.

E. Store asphalt cement and other bituminous materials in tightly closed containers.

1.9 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Mortar and Grout:

1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.

a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set pavers within 1 minute of spreading setting-bed mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 STONE PAVERS

A. Manufacturer and Material: Match stone supplied under Section 044200 "Exterior Stone Cladding.".

B. Finish: Thermal unless otherwise indicated.

C. Match Commissioner's samples for color, finish, and other stone characteristics relating to aesthetic effects.

D. Thickness: Not less than 1-5/8 inches unless otherwise indicated.

E. Face Size: As indicated.

2.3 ACCESSORIES

A. Compressible Foam Filler: Preformed strips complying with ASTM D1056, Grade 2A1.

2.4 MORTAR SETTING-BED MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II.

B. Hydrated Lime: ASTM C207, Type S.

C. Sand: ASTM C144.

D. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed, and not containing a retarder.

E. Water: Potable.

F. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062 inch in diameter; comply with ASTM A1064/A1064M except for minimum wire size.

2.5 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, made of white or gray cement and white or colored aggregate as required to produce color indicated.

B. High-Performance Cement Grout: ANSI A118.7, sanded.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ARDEX Americas.
b. Custom Building Products.
c. LATICRETE SUPERCAP, LLC.
d. MAPEI Corporation.
e. Summitville Tiles, Inc.
f. Or approved equal.

2. Polymer Type:

a. in liquid-latex form for addition to prepackaged dry-grout mix.

C. Grout Colors: As selected by Commissioner from manufacturer's full range.

D. Water: Potable.

2.6 MORTAR AND GROUT MIXES

A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimal performance characteristics. Discard mortars and grout if they have reached their initial set before being used.

B. Portland Cement-Lime Setting-Bed Mortar: Type M complying with ASTM C270, Proportion Specification.

C. Job-Mixed Portland Cement Grout: Proportion and mix job-mixed portland cement and aggregate grout to match setting-bed mortar except omit hydrated lime and use enough water to produce a pourable mixture.

1. Colored-Aggregate Grout: Produce color required by combining colored aggregates with portland cement of selected color.

D. Packaged Grout: Proportion and mix according to grout manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.

C. Proceed with installation only after unsatisfactory conditions have been corrected and waterproofing protection is in place.

3.3 PREPARATION

A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

3.4 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

C. Handle protective-coated brick pavers to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.

D. Joint Pattern: As indicated.

E. Pavers over Waterproofing: Exercise care in placing pavers and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Carefully replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with paving.

1. Provide joint filler at waterproofing that is turned up on vertical surfaces unless otherwise indicated; where unfilled joints are indicated, provide temporary filler or protection until paver installation is complete.

F. Tolerances:

1. Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

G. Expansion and Control Joints:

1. Provide for sealant-filled joints at locations and of widths indicated. Provide compressible foam filler as backing for sealant-filled joints unless otherwise indicated; where unfilled joints are indicated, provide temporary filler until paver installation is complete. Install joint filler before setting pavers. Sealant materials and installation are specified in Section 079200 "Joint Sealants."

3.5 MORTAR SETTING-BED APPLICATIONS

A. Apply mortar-bed bond coat over insulation. Do not exceed 1/16-inch thickness for bond coat. Limit area of bond coat to avoid its drying out before placing setting bed.

B. Apply mortar bed over bond coat; spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

C. Where required by thickness of bed, place mortar bed with reinforcing wire fully embedded in middle of mortar bed. Spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

D. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.

E. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1/16-inch- thick bond coat to mortar bed or to back of each paver with a flat trowel.

F. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

G. Spaced Joint Widths: Provide 1/4-inch nominal joint width with variations not exceeding plus or minus 1/16 inch.

H. Grouted Joints: Grout paver joints complying with ANSI A108.10.

I. Grout joints as soon as possible after initial set of setting bed.

1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
2. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.
3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
4. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.

J. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout or liquid-latex manufacturer.

3.6 CORRECTIVE WORK, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

END OF SECTION 321400

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes: Tree plantings in the public right-of-way as shown on the Contract Drawings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials for the Work must conform to the NYCDOT and NYCDPR Standard Specifications, as applicable, and latest revisions and bulletins.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

3.3 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by planting operations.

3.4 EXCAVATION FOR TREES

A. Excavation and backfill must conform to the NYCDOT and NYCDPR Standard Specifications, as applicable, and latest revisions and bulletins.

3.5 TREE PLANTING

A. Planting must conform to the NYCDOT and NYCDPR Standard Specifications, as applicable, and latest revisions and bulletins.

B. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.6 CORRECTIVE WORK AND REPLACEMENT

A. Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by NYCDOT and NYCDPR.

3.7 FIELD QUALITY CONTROL

A. The Contractor's Certified Arborist shall contact Parks prior to planting.

3.8 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off City of New York's property.

C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before Substantial Completion remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION 329300

SECTION 330519 – DUCTILE IRON UTILITY PIPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Work of this Section includes:

1. Construction of the combined sewer lateral within the public right-of-way.
2. Construction of the water services within the public right-of-way. This shall include, but not be limited to the following: pipe and fittings for water lines including domestic water line and fire water lines and valves.
3. This section does not include work within the building footprint.

B. Related Sections:

1. Section 310000 "Earthwork"

1.3 STANDARDS AND REFERENCES

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings

B. Codes: All Work under this Section shall conform to the most restrictive requirements of the New York City Building Code (2014 edition).

C. NYCDEP Bureau of Water and Sewer Rules and Specifications, latest revision.

D. Sewer Pipe - ASTM (American Society for Testing and Materials) Specifications, latest edition:

1. ASTM A536 – Ductile Iron Castings
2. ANSI C150 – Ductile Iron Pipe (DIP) Class 56, Ceramic Epoxy lined Tyton Joints
3. ANSI C151 – Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for water or other liquids.

E. Water Pipe - American Society for Testing Materials (ASTM), American National Standards Institute (ANSI), and American Water Works Association (AWWA)Specifications, latest edition:

1. ANSI/ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
3. ASTM B88 - Seamless Copper Water Tube.
4. ANSI/AWS A5.8 - Brazing Filler Metal.
5. ANSI/AWWA C104 - Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
6. ANSI/AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
7. ANSI/AWWA C111- Rubber-Gasket Joints for Ductile Iron and Grey Iron Pressure Pipe and Fittings.
8. ANSI/AWWA C151 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water or Other Liquids
9. ANSI/AWWA C500 - Gate Valves, 3 through 48 inches NPS, for Water Systems.
10. ANSI/AWWA C509 - Resilient Seated Gate Valves 3 inches through 12 inches NPS, for Water and Sewage Systems.
11. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Appurtenances.
12. ANSI/AWWA C606 - Grooved and Shouldered Type Joints.

1.4 DEFINITIONS

A. Bedding: Fill placed under, beside and around pipe, prior to subsequent backfill operations

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures”.

B. The Contractor must provide the following submittals to the Commissioner for approval prior to purchase of materials:

1. Material Certificates
2. Product Warranty
3. Product Data
4. Manufacturer's Certificate

1.6 CONSTRUCTION QUALITY CONTROL

A. Refer to DDC General Conditions, Section 014000 “Quality Requirements”.

B. Perform work in accordance with NYCDEP and NYCDOB requirements.

C. The Contractor will be fully familiar with the material and NYCDEP installation requirements of pipelines (per the technical specifications) and provide personnel to ensure that the correct material is handled and installed in the correct manner to provide a complete operating system in accordance with the Contract Documents.

D. The Contractor will be required to review the technical specifications to determine the project survey and stakeout requirements for the installation of pipelines at the vertical and horizontal location shown or specified in the Contract Documents.

1.7 PERMITS AND APPROVALS

A. Obtain street opening permit, and all permits and inspections for the sanitary sewer system construction as required by New York City Department of Environmental Protection (NYCDEP), New York State Department of Environmental Conservation (NYSDEC), and New York State Department of Transportation (NYSDOT).

1.8 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of pipe runs, connections, catch basins, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions and the discovery of uncharted utilities

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 “Quality Requirements”.

PART 2 - PRODUCTS

2.1 SEWER PIPE MATERIALS AND ACCESSORIES

A. Ductile Iron Pipe: Comply with requirements of AWWA C104 Cement Mortar Lining, AWWA C110 Ductile Iron Fittings, AWWA C111 Joints and Fittings, AWWA C150 Thickness, AWWA C151 Ductile Iron Pipe. All buried Ductile Iron Pipe (DIP) shall be mechanical joint unless otherwise shown on the drawings, specified herein, or directed by the Commissioner. Mechanical Joint DIP and fittings shall be minimum Class 52, unless otherwise specified.

2.2 WATER PIPE MATERIALS AND ACCESSORIES

A. Ductile Iron Pipe: Cement-Lined, ANSI A21.10 (AWWA C-151) Class 56 for pipe 6 inch diameter and larger; Class 52 for smaller than 6 inch diameter:

1. Fittings: Ductile iron, standard thickness.
2. Joints: AWWA C151, mechanical joints.
3. Cement mortar lining: AWWA C-104.
4. Retainer glands: Ductile Iron, 350 psi pressure rating.

B. Gate Valves – 3 inches and over

1. Manually operated, inside non-rising stem, ductile iron body/bonnet/seal plate, non-packing, bronze seated, double disc, seating wedge mechanism gate valve; model and manufacturer as approved by the NYCDEP Bureau of Water and Sewer and Commissioner.

2.3 CONCRETE MATERIALS

A. Concrete for Thrust Blocks: Place thrust blocking consisting of 3,000 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 lbs/sq. ft. when water main pressure is 100 psi.

2.4 SUBSTITUTIONS

A. All products shall be as approved by NYC DEP and the Commissioner. No substitutions will be accepted without prior approval by NYC DEP and the Commissioner.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for “Execution Requirements”.

3.2 EXAMINATION

A. Obtain NYCDEP permit to perform the work.

B. Contact NYCDEP for field inspection.

C. Verify the trench cut and excavation base to be hard, smooth, and dry.

D. Verify excavation location, dimensions, and elevations with Contract Drawings.

3.3 PREPARATION

A. Set all lines, elevations, and grades for utility work and maintain for the duration of work. Provide careful maintenance of benchmarks, property corners, monuments, or other reference points.

B. Protect and maintain in operating condition, existing utilities encountered during utility installation. Restore any damage to surface or subsurface improvements shown on the drawings.

C. Coordinate structure placement with inlet and outlet pipe or duct sleeve locations and inverts required by other sections.

D. Coordinate all building sewer connection locations and elevations with civil and plumbing plans. Comply with 2014 New York City Construction Codes.

E. Hand trim excavations to required elevations and thoroughly compact as per DDC General Conditions.

F. Install dewatering systems that will be required to construct the proposed utilities to the design elevations and using the methods described herein. Water pumped out of excavations shall be disposed of per NYCDEP and DDC General Conditions and will not be discharged directly to the City's storm drainage system without prior approval of NYCDEP.

G. Remove large stones or other hard matter which may damage piping or impede consistent backfilling or compaction.

H. Subgrade areas identified by the Commissioner as unsuitable shall be excavated to suitable material or a maximum of two additional feet, backfill with bedding material and compact as specified in Section 310000 “Earthwork”.

3.4 INTERFACE WITH EXISTING FACILITIES

A. Requirements: Make all required connections of the proposed drainage facilities into existing facilities, where and as shown on the Drawings in accordance with the New York City Department of Environmental Protection.

B. Compliance with NYC Requirements: Connections made into existing facilities shall be performed in accordance with the requirements of the New York City Department of Buildings (NYCDOB), New York City Department of Environmental Protection (NYCDEP), and New York City Department of Transportation (NYCDOT). The Contractor will be required to comply with all such requirements, including securing of all required permits, and expenses thereof. The expense of making the connections in accordance with all such requirements shall be included in the Contract Sum.

C. Construct service lines to within 5 feet of the building entry point.

3.5 CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY

A. Construction within the public right-of-way shall conform to all requirements of the New York City Department of Environmental Protection (NYCDEP), New York City Department of Transportation (NYCDOT), and New York State Department of Transportation (NYSDOT).

3.6 BEDDING – SEWER PIPE

A. Excavate pipe trench in accordance with Section 310000 “Earthwork” for work of this section.

B. Place and compact bedding material at trench bottom. Hand trim bedding for accurate placement of pipe to elevations indicated.

C. Maintain moisture content of bedding material between 1% below and 3% above the optimum.

3.7 BEDDING – WATER PIPE

A. Excavate pipe trench in accordance with Section 310000 - Earthwork.

B. Form and place concrete for pipe thrust restraints at any change of pipe direction.

C. Place bedding material at trench bottom.

D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact in accordance with Construction Documents.

3.8 INSTALLATION – SEWER PIPE

A. Place pipe on minimum 6-inch-deep bed of compacted bedding aggregate.

B. Install pipe, fittings, and accessories in accordance with ASTM C12, ASTM D2321, manufacturer's instructions and/or state or local requirements. Seal joints to be watertight.

C. Lay pipe to slope gradients noted on civil drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Place and compact bedding aggregate at sides and to the spring line of the pipe as per Section 310000.

E. All sewer pipe joints installed within ground water or partially submerged within ground water shall be installed with watertight joints.

F. Pipe joints shall not be installed within the leachate collection stone trench.

G. Refer to Section 310000 “Earthwork” for trenching and backfill requirements. Do not displace or damage pipe when compacting.

3.9 INSTALLATION – WATER PIPE

A. Maintain separation of water main from sanitary and storm sewer piping in accordance with NYCDEP, New York state, and New York City Building Code. Unless otherwise approved, water mains shall be separated from sanitary sewer pipes a minimum distance of 10 feet horizontal or 18 inches vertical.

B. Install ductile iron piping and fittings to ANSI/AWWA C600.

C. Route pipe in straight line.

D. Install pipe to allow for expansion and contraction without stressing pipe or joints.

E. Install access fittings to permit disinfection of water system performed under this section.

F. Slope water pipe and position drains at low points.

G. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.

H. Coordinate with NYCDEP for new wet tap to existing main.

I. Establish elevations of buried piping to ensure not less than 4-ft of cover over the top of pipe under proposed grading. Locations where shallow cover cannot be avoided must be brought to the attention of the Commissioner for review.

J. Backfill trench in accordance with Construction Documents.

K. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each on-site wet tap connection under conditions which least interfere with operation of existing pipeline. NYCDEP will provide wet tap to their main.

3.10 INSTALLATION – VALVES

A. Maintain separation of water main from sanitary and storm sewer piping in accordance with NYCDEP, New York state, and New York City code. Unless otherwise approved, water mains shall be separated from sanitary sewer pipes a minimum distance of 10 feet horizontal or 18 inches vertical.

B. Install ductile iron piping and fittings to ANSI/AWWA C600.

C. Route pipe in straight line.

3.11 FIELD QUALITY CONTROL - SEWER

A. Backfill placement and quantity control will be performed in accordance with Section 310000 “Earthwork”.

B. If tests indicate work does not meet specified requirements, remove work, replace and retest at no additional expense to the City of New York.

C. Inspection and Testing - Cooperate with the Commissioner to facilitate testing and inspection of the work. Clean and "Lamp" the lines in the presence of the Commissioner before final acceptance of the work. Infiltration and Exfiltration Testing shall be determined by the Commissioner and shall meet New York City Department of Building and New York City Department of Environmental Protection standards.

D. The complete sanitary sewer system, including all mains, lateral sewers and manholes shall be tested for both infiltration and exfiltration. Provide all materials equipment and services as necessary to perform the tests as described herein except as noted.

E. Infiltration Testing - The ends of any service sewers shall be securely plugged and the sewer main plugged at the manhole at the low end. The uppermost manhole shall be filled with water to a level of 4 feet above the top of the sewer or 4 feet above the groundwater level. The water shall stand for 2 hours to allow the sewer system to reach its maximum absorption. Subsequently, the uppermost manhole shall be refilled to the original 4 feet height.

1. Rate of infiltration shall be determined by means of V-notch weirs or other approved measuring devices in an approved manner and at such times and locations as may be directed by the Commissioner. The maximum leakage limit shall be 100 gallons per inch of diameter, per day, per mile.

2. For shorter stretches, less than 500 feet in length, rate of 100 percent in total excess of the above figures may be permitted, providing the total infiltration is in excess of the maximum allowable, the leaking joints shall be re-laid if necessary, or other remedial construction shall be performed by and at the expense of the Contractor. The section of sewer shall then be re-tested after restorations are completed to determine compliance with the specifications.

F. Low Pressure Air Exfiltration Testing - The sewer mains or laterals shall be tested for leakage by the use of low-pressure air as specified hereinafter and as approved by the Commissioner. Provide test plugs, air compressor, and installers properly instructed by the manufacturer for conducting the test. The test length shall not exceed one (1) interval of pipe between two (2) manholes. Take all necessary precautions to prevent blowouts.

1. After the pipe has been backfilled and cleaned, pneumatic plugs shall be placed in the line at each manhole and inflated to 25 psi. Low-pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psi greater than the average back pressure of any groundwater that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize.
2. After the stabilization period (3.5 psi minimum pressure in the pipe), the portion of line being tested shall be acceptable if the time required in minutes for the pressure to decrease from 3.5 to 3.0 psi (greater than the average back pressure of any groundwater that may be over the pipe) is not less than the time indicated in the following table:

Pipe Size	Time (Min.)
4	2.5
6	4
8	5
10	6.5
12	7.5
15	9.5

G. Correction of Defective Work - If leakage exceeds the specified amount, the Contractor shall at their own expense make the necessary restorations or replacements required to permanently reduce the leakage to within the specified limit and the tests shall be repeated until the leakage requirement is met.

1. Any defects found in the system are to be restored at the expense of the Contractor so to conform strictly to the Specifications and to the satisfaction of the Commissioner. All restorations shown necessary by the tests are to be made, broken or cracked pipe replaced, all deposits removed, and sanitary sewer left true to line and grade and entirely clean, free from lumps of cement, protruding gaskets, bulkheads, etc., and ready for use before final acceptance by the Commissioner.

3.12 FIELD QUALITY CONTROL - WATER

A. Water line installation and testing shall be certified to the NYCDOB by a plumber licensed in the State of New York. The Contractor shall cooperate with the Commissioner as required to facilitate testing and inspection of the work.

B. Test water distribution system installed below grade and outside the building in accordance with NYCDEP and NYCDOB and the following procedures:

1. All pipework shall be tested at a hydrostatic pressure equal to 150 psi. The pipe work shall maintain said pressure for not less than two hours.
2. Furnish, install, and operate the necessary connections, pumps, meters, and gauges. Leakage shall not exceed that permitted by AWWA Specifications C600 64 for mechanical joint and push on joint pipe. Prior to running any field test, a meter shall be tested, sealed, and approved by NYCDEP and NYCDOB at Contractor's expense.
3. Locate and restore any leaks. Repeat testing until process results are satisfactory and in compliance with this section.
4. Furnish a copy of the results of the meter test and the hydrostatic pressure test to the Commissioner upon completion of water distribution system backfilling operations.

C. Contractor shall call for NYCDEP inspection of all waterline work and shall be responsible for obtaining all NYCDEP signoffs, including but not limited to tap release letters and meter release letters.

D. All waterline work, including but not limited to meters, taps, and backflow prevention device shall be constructed in accordance with the latest version of RCNY Title 15 Chapter 20 Rules Governing and Restricting the Use and Supply of Water.

3.13 FIELD INSPECTION AND TESTING - SEWER

A. Upon completion of the Work and before backfill is placed and final acceptance by the Commissioner, the drainage system shall be subject to a final inspection in the presence of the Commissioner. The Work shall not be considered as complete until all requirements for line, grade, cleanliness, and workmanship have been completed to the satisfaction of the Commissioner.

3.14 FINAL INSPECTION AND TESTING - WATER

A. Upon completion of the Work and before backfill is placed and final acceptance by the Commissioner, the entire drainage system shall be subject to a final inspection in the presence of the Commissioner. The Work shall not be considered as complete until all requirements for line, grade, cleanliness, and workmanship have been completed to the satisfaction of the Commissioner.

END OF SECTION 330519

SECTION 339000 – OTHER UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Work of this Section includes:

1. Furnish labor, materials, services, equipment, and other necessary items required to excavate, install and backfill the piping, conduit, and duct banks related to the electrical and gas services within the right-of-way in accordance with the Contract Documents.
2. This section does not include work within the building footprint.

B. Related Sections:

1. Section 310000 "Earthwork"

1.3 STANDARDS AND REFERENCES

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings

B. Codes: All Work under this Section shall conform to the most restrictive requirements of the New York City Building Code (2014 edition).

C. Consolidated Edison Specifications, Blue Book, 2015 Edition

D. The National Electric Code, Latest Edition

E. New York City Fire Department Standard Details and Specifications, Latest Edition

1.4 DEFINITIONS

A. Bedding: Fill placed under, beside and around pipe, prior to subsequent backfill operations

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

1.6 CONSTRUCTION QUALITY CONTROL

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

B. All work in this Section shall be coordinated with the Commissioner and electric and gas utility companies and shall comply with all requirements, details, regulations, etc. of said companies. The Contractor shall coordinate with each utility to define where the limit of work exists.

C. The Contractor will be required to review the technical specifications to determine the project survey and stakeout requirements for the installation of pipelines at the vertical and horizontal location shown or specified in the Contract Documents.

1.7 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of pipe runs, connections, catch basins, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions and the discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements".

PART 2 - PRODUCTS

2.1 PIPING, CONDUIT, FITTINGS, VALVES, AND CABLE

A. Electric and Gas: Refer to Division 23 and 26 of the Technical Specifications and the Contract Drawings.

2.2 BEDDING AND BACKFILL

A. Refer to Section 31000 – "Earthwork".

2.3 CONCRETE ENCASEMENT

A. Concrete for encasement of electric duct banks shall be 3,500 psi concrete.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for “Execution Requirements”.

3.2 EXAMINATION

A. Verify the trench cut and excavation base to be hard, smooth, and dry.

B. Verify excavation location, dimensions, service connection points, and elevations with Contract Drawings.

3.3 PREPARATION

A. Set all lines, elevations, and grades for utility work and maintain for the duration of work. Provide careful maintenance of benchmarks, property corners, monuments, or other reference points.

B. Protect and maintain in operating condition, existing utilities encountered during utility installation. Restore any damage to surface or subsurface improvements shown on the drawings.

C. Hand trim excavations to required elevations and thoroughly compact as per DDC General Conditions.

D. Install dewatering systems that will be required to construct the proposed utilities to the design elevations and using the methods described herein. Water pumped out of excavations shall be disposed of per NYCDEP and DDC General Conditions and will not be discharged directly to the City's storm drainage system without prior approval of NYCDEP.

E. Remove large stones or other hard matter which may damage piping or impede consistent backfilling or compaction.

F. Subgrade areas identified by the Commissioner as unsuitable shall be excavated to suitable material or a maximum of two additional feet, backfill with bedding material and compact as specified in Section 310000 “Earthwork”.

3.4 BEDDING

A. Excavate all utility trenches and place bedding in accordance with Specification Section 310000 “Earthwork” and the Contract Documents.

3.5 INSTALLATION – SEWER PIPE

A. Conduit:

1. Maintain minimum conduit separation in accordance with the New York City Building Code.

2. Establish elevations of conduit in accordance with Section 310000 – "Earthwork" and the Contract Drawings.
3. Place forms for concrete encased duct banks. Install conduit to conserve space and to allow for expansion and contraction without stressing conduit or joints. Pour concrete and vibrate to ensure there are no voids.
4. Backfill trench in accordance with Section 310000 – "Earthwork".

B. Service Connections:

1. Construct service lines to within 5 feet of the exterior building wall at the building entry point unless otherwise indicated on the Contract Drawings. Cap and stake ends of conduits.
2. Connections with existing facilities shall be performed in accordance with the requirements of the specific utility company. The Contractor shall be required to comply with all such requirements, including securing all permits, and payment of all permit and/or connection fees related to this section.

C. Any product, which is damaged or disturbed through any cause prior to acceptance of the Work, shall be restored, realigned, or replaced as directed by the Commissioner, at no expense to the City of New York.

3.6 INSTALLATION – VALVES

A. Maintain separation of water main from sanitary and storm sewer piping in accordance with NYCDEP, New York state, and New York City Building Code. Unless otherwise approved, water mains shall be separated from sanitary sewer pipes a minimum distance of 10 feet horizontal or 18 inches vertical.

B. Install ductile iron piping and fittings to ANSI/AWWA C600.

C. Route pipe in straight line.

3.7 FIELD QUALITY CONTROL

A. Backfill placement and quantity control will be performed in accordance with Section 310000 "Earthwork".

B. If tests indicate work does not meet specified requirements, remove work, replace and retest at no additional expense to the City of New York.

3.8 FIELD INSPECTION AND TESTING

A. Upon completion of the Work and before backfill is placed and final acceptance by the Commissioner, the drainage system shall be subject to a final inspection in the presence of the Commissioner. The Work shall not be considered as complete until all requirements for line, grade, cleanliness, and workmanship have been completed to the satisfaction of the Commissioner.

END OF SECTION 339000

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: October 21, 2024; between 11:30am and 2:00pm
BID OPENING DATE/ TIME: October 21, 2024; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24	SZ	PS

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

September 16, 2024

ADDENDUM No. # 1

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **Bidders Questions and Responses to Questions:**
   See Attachment A.

2. **Revisions to Documents:**
   See Attachment B.

3. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled "Transferring Data Between Rounds of an RFX" has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

DDC strongly advises vendors to finalize and submit bids 48 hours prior to due date and time. The City is not responsible for technical issues (e.g. internet connection, power outages, technology malfunction, computer errors, etc.) related to bid submissions.

If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

No.	Bidders Questions	DDC Responses
1	There are numerous files here on this Passport project incorrectly attributed to this LQQ122-RG Rego Park Library, which are actually from Eastern Parkway Library. Please clarify which items are correct, necessary and/or potentially missing from the Rego Park RFx.	The PASSPort RFx has been updated to include the relevant files for this project's Volume 3 and Appendix.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

Volume 3 and **Appendix**: files have been updated for LQQ122-RG.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 2 of the procurement.

Please note that numbering of addenda is independent of rounds.

Questionnaire Changes:

None

Item Grid Changes:

None

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: November 4, 2024; between 11:30am and 2:00pm
BID OPENING DATE/ TIME: November 4, 2024; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24	[redacted]	
#2 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/11/24		NA

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

October 11, 2024

ADDENDUM No. # 2

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **The Bid Opening for the contract described below scheduled for October 21, 2024, at 2:30 pm is rescheduled to November 4, 2024 at 2:30 pm.**

   Contract #1 General Construction

2. **Bidders Questions and Responses to Questions:**
   See Attachment A. (Not Used)

3. **Revisions to Documents:**
   See Attachment B.

4. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled "Transferring Data Between Rounds of an RFX" has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

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If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

NOT USED

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

Revisions to Volume 2:
Updated Construction Worker Prevailing Wage Schedule, dated 10/9/2024 is included.

Revisions to the Drawings:
Duplicate Drawing files have been removed from the PASSPort RFx.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 3 of the procurement.

Please note that numbering of addenda is independent of rounds.

Bid Opening Date Changes:

The Bid Opening scheduled for October 21, 2024 at 2:30pm is rescheduled for November 4, 2024 at 2:30pm.

Questionnaire Changes:

None

Item Grid Changes:

None

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: November 4, 2024; between 11:30am and 2:00pm
BID OPENING DATE/ TIME: November 4, 2024; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24		
#2 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/11/24		
#3 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/16/24	LN	NA

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

October 16, 2024

ADDENDUM No. # 3

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **Bidders Questions and Responses to Questions:**
   See Attachment A. (Not Used)

2. **Revisions to Documents:**
   See Attachment B.

3. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled "Transferring Data Between Rounds of an RFX" has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

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If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Sarah Zomick for

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

NOT USED

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

All files have been relinked in the PASSPort Documents tab.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 4 of the procurement.

Please note that numbering of addenda is independent of rounds.

Questionnaire Changes:

None

Item Grid Changes:

None

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: November 18, 2024; between 11:30am & 2:00pm
BID OPENING DATE/ TIME: November 18, 2024; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24		
#2 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/11/24		
#3 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/16/24		
#4 Revised Bid Opening Date		10/28/24	SZ	NA

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

October 28, 2024

ADDENDUM No. # 4

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **The Bid Opening for the contract described below scheduled for November 4, 2024, at 2:30 pm is rescheduled to November 18, 2024 at 2:30 pm.**

   Contract #1 General Construction

2. **Bidders Questions and Responses to Questions:**
   See Attachment A. (Not Used)

3. **Revisions to Documents:**
   See Attachment B.

4. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled “Transferring Data Between Rounds of an RFX” has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

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If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

NOT USED

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

NOT USED

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 5 of the procurement.

Please note that numbering of addenda is independent of rounds.

Bid Opening Date Changes:

The Bid Opening scheduled for November 4, 2024 at 2:30pm is rescheduled for November 18, 2024 at 2:30pm.

Questionnaire Changes:

None

Item Grid Changes:

None

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: December 4, 2024; between 11:30am & 2:00pm
BID OPENING DATE/ TIME: December 4, 2024; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24		
#2 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/11/24		
#3 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/16/24		
#4 Revised Bid Opening Date		10/28/24		
#5 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		11/15/24	SZ	PS

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

November 15, 2024

ADDENDUM No. # 5

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **The Bid Opening for the contract described below scheduled for November 18, 2024, at 2:30 pm is rescheduled to December 4, 2024 at 2:30 pm.**

   Contract #1 General Construction

2. **Bidders Questions and Responses to Questions:**
   See Attachment A.

3. **Revisions to Documents:**
   See Attachment B.

4. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled “Transferring Data Between Rounds of an RFX” has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

DDC strongly advises vendors to finalize and submit bids 48 hours prior to due date and time. The City is not responsible for technical issues (e.g. internet connection, power outages, technology malfunction, computer errors, etc.) related to bid submissions.

If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

No.	Bidders Questions	DDC Responses
1	We reached out to Bibliotheca regarding the book Self-Check 1000 in section 115116 Book Depositories. A representative from Bibliotheca is stating the library has a contract with Bibliotheca and purchases the equipment directly. Please clarify if purchased directly from library or if we are to include in bid.	Contractor is to include in Bid. This equipment will not be purchased by the Library.
2	There is a specification section 230546 on Coatings for HVAC; however, the only place that calls for a special UV coating is on Outdoor Fans. Please confirm.	Per fan schedule notes in the M series, coating to be provided to protect against UV and weather for outdoor fans. Note that other specifications, such as metal ducts, insulation, and other equipment, will require protection from the outdoors, as well.
3	Drawing M-301 flow diagram indicates to install a Bag Filter. Please provide make and model number of this item.	See revised drawing M-301 for bag filter schedule, issued as part of this Addendum.
4	Detail on drawing M-401 shows a Make Up Pump. Please advise if this is required and if so, provide an equipment schedule.	Make Up Pump is required. Schedule is shown on M-501.
5	Please confirm base bid finish specifications to be used for items noted as "provide one of the following" in the project spec book (eg, for finishes such as ceramic tile).	Confirmed. Refer to DDC General Conditions Section 016000 Product Requirements for clarification on product options.
6	Please confirm if GC is responsible for installation of secant foundation. Some notes on plans indicate 'by others,'	Confirmed, Contractor is responsible for secant foundation. Refer to FO-600 series for further information.
7	Please confirm furniture is by others and not included in GC scope.	Confirmed, furniture purchase and install is not part of Contractor's scope.
8	Please confirm Low Voltage scope is to be included in GC base bid (eg, Tel-Comm, AV, Security).	Confirmed, low voltage scope to be included.
9	Please provide preferred elevator vendor name and contact if available, or confirm if GC can solicit pricing from any qualified elevator subcontractor.	Refer to specification section 142123.16 Machine Room-Less Electric Traction Passenger Elevators, Article 2.1.A for manufacturers. Contractor can solicit pricing from any qualified elevator subcontractor that meets the requirements set forth in the Contract Documents.
10	Please confirm if Montel Aetnastak shelving system is required, or if GC can provide custom shelving with similar design intent as a V.E option.	Montel Aetnastak shelving system is required per 115123 Library Stack Systems; it is a Queens Public Library standard. Also refer to Proprietary Items List included in the PASSPort RFx.
11	Please confirm base to be used at teen reading room C05 per 6,7/A-602. Elevation notes "Per Schedule."	Refer to A-701 for Finish Schedule and Finish Legend.

12	Please confirm if GC is responsible for flat screen displays, projection screens etc. as shown on plans.	Confirmed, Contractor is responsible for elements shown in TA drawing series and 274116 Integrated Audiovisual Systems.
13	Fixture schedule on E-002 says to refer to lighting designer specs. Please provide lighting designer specifications, or advise where this information can be found.	Refer to Specification sections 265119 LED Interior Lighting and 265619 LED Exterior Lighting in Volume 3.
14	Addendum 1, Volume 3, Schedule A, Part 1 indicates the Sub-Contract participation shall not exceed 60%. We request this percentage be raised to 90% which is more in line for what is required to perform the work indicated for this project.	Submit bid with the % limit as per the Contract Documents and according to Article 17 of the Standard Construction Contract. If you become the low bidder and are awarded the project, you then may request Commissioner permission for the % change with a provided explanation as to your request.
15	Re: Terrazzo to Carpet Tile: which subcontractor will provide and install zinc divider strip see detail 2 on Drawing A-703?	Contractor is responsible for providing this, and may subcontract as necessary per means and methods. The divider strip is meant to act as a pour stop for the adjacent epoxy terrazzo. See section 096623-6 2.5 A for clarification.
16	Re: Carpet Tile to Floor Boxes: which subcontractor will provide and install zinc divider strip per detail 11 on Drawing A-64?	Contractor is responsible for providing this, and may subcontract as necessary per means and methods. See bubbled A-641 for revised divider strip language, included with this Addendum.
17	Re: Carpet Tile to Floor Boxes, zinc divider strip: which specification section is zinc divider strip for a product style number?	Refer to 096813-5 paragraph 2.2.C for aluminum divider strip specification. See bubbled A-641, issued as part of this Addendum, for revised divider strip language.
18	Section 096813-5 para 2.2.C calls for extruded aluminum. Please clarify if zinc or extruded aluminum divider strip is needed for this bid scope.	Section 096813-5 paragraph 2.2.C (aluminum) is to be used for carpet divider strips within the carpet. Section 096623-6 2.5 A (white-zinc alloy) is to used at the terrazzo.
19	What material is the 1'-0" band around edge of CPT carpet tile in Rooms C05, 103, 201 and 202, per Drawings A-130 to A132?	The material is epoxy terrazzo – same as adjacent epoxy terrazzo.
20	Carpet Tile Section 096813-4 para 2.1.P refers to drawings Finish Schedule. Please point us to size on Drawing A-701.	Refer to 096813-4 paragraph 2.1.A for sizes.
21	Carpet Tile Section 096813-4 para 2.1.A notes Bentley Vertex 24" x 24" as Basis of Design. Ss this product OK to use for this bid scope?	Yes.
22	Please confirm that no carpet tile attic stock is required for this bid scope.	Confirmed. Attic stock is not included as part of this contract.
23	Specification section 083323.13 is for overhead coiling shutters, but we cannot find them on the drawings. Please confirm these are to be included and if so, show on drawings and provide details.	Overhead coiling shutters are not part of project. Section is removed as noted on Attachment B – Revisions to the Documents.
24	Please clarify what material is to be used at the 1 foot border around carpet tile at rooms 103, 201, and 202 indicated on Drawings A-130 and A-131. Provide a section or transition detail of where Carpet Tile / Border, and Terrazzo adjoin.	The border is to be epoxy terrazzo – same as adjacent epoxy terrazzo. See detail 7 on A-641 for typical terrazzo divider strip detail, and added detail 14 on A-641, included as part of this Addendum, for typical transition between epoxy terrazzo and carpet tile.

25	Electrical drawing E-002 references Lighting Designer specifications. Please provide with catalogue and model numbers.	Refer to sections 265119 LED Interior Lighting and 265619 LED Exterior Lighting in Volume 3.
26	Please provide length for fixture type F18.	F18 fixture length to be per the architectural reflected ceiling plans A-150, A-151, and A-152.
27	Please provide specification of 10kw inverter.	Refer to section 263323.11 for the inverter requirements.
28	Please confirm that all conduits listed on E-500 MDP schedule must be RGS as shown for the entire run.	Where feeders are routed underground or subject to outdoor conditions, RGS is required; otherwise, EMT is acceptable.
29	Please provide conduit and wire size for loads being fed from service switch #1 and #2.	Line side and Load side of feeders at service switch #1 and service switch #2 must match emergency feeder per EDP panel schedule on Drawing E-501.
30	Drawing TT-600 indicates 1-1/4" conduit from stations and j-hooks. Pathway note #18 on TT-000 indicates j-hooks above accessible ceilings. Specification section 270533-8 G1(b) indicates 1" conduit from outlets to equipment room. Please clarify conduit sizes and confirm IT cabling can be run on j-hooks above accessible ceilings.	Within accessible ceilings (i.e., ACT or removable panel ceilings), cables are to be supported by J-Hooks. Within inaccessible ceilings (i.e., GWB or similar), cables are to be routed within conduits. Each wall-mounted data outlet is to be provided a 5-inch square telecommunications backbox with integrated cable management with conduit to an accessible ceiling: - Use 5-inch or 2-gang outlet backbox. - Conduits are to be 1-inch for up to two (2) cables and 1 1/4-inch for up to (4) cables. For WAP locations with an enclosure, provide one (1) 1-inch conduit between the enclosure and an accessible ceiling.
31	Please provide a lighting schedule that indicates the manufacturer and product/model number. The schedule provided on the drawings does not have this information and lighting vendors can't provide price without it.	Refer to section 265119 LED Interior Lighting and 265619 LED Exterior Lighting for this information.
32	Building code summary on G-003 says that for construction type IIB w/ automatic sprinklers, no fire resistance rating is required over primary structural frame. However, hatched areas for 1 hour & 2 hour rated sprayed fireproofing are marked at G-004. Please clarify whether fireproofing over structural steel framing is required.	G-003 also states: "The supporting construction for stairs, elevators, shaft construction, and other fire rated elements must be protected to afford the required fire resistance rating of the element supported per section 707.5.1." To meet this code requirement, fireproofing is required as shown on G-004.
33	As per specification section 096623/3.3/E, moisture vapor emission control membrane is to be installed on concrete substrates that incorporate lightweight aggregates. Where are these locations of these Concrete substrates?	Refer to structural drawings for the locations of lightweight concrete for verification. The base of Stair 1 at the cellar level is lightweight concrete underneath terrazzo, and will require the moisture vapor emission control membrane per the specifications. Additionally, there will be a concrete topping slab at Vestibule 101; see S-100 for extent. Contractor to verify whether this topping slab will be lightweight concrete, in which case the membrane will be required.
34	As per A-701 Finish schedule, TERR-1 has Beige color; however, per specification 096623/2.3/B/1, color 1 is Honey color terrazzo. Please clarify.	Follow the specification section, which describes the exact desired matrix and chips. See revised A-701 as part of this Addendum, coordinating the color to be "Honey" to match the specifications.

35	Who is responsible for the installation of stainless steel plate saddle (Stainless steel threshold -2'0" wide) as per 1/A-100,1/A-101 & 1/A-102 in the rooms getting terrazzo?	Contractor is responsible for providing this, and may subcontract as necessary per means and methods.
36	Please provide the transition detail of terrazzo to stainless steel plate saddle in cellar,1st & 2nd floor.	See A-641, detail 9 for this information.
37	Please confirm if the terrazzo should not go underneath the stainless steel plate saddle in 1/A-100, 1/A-101 and 1/A-102.	Confirmed; see A-641, detail 9 for clarification.
38	Finish plans call out for terrazzo flooring in water closet rooms. Please confirm if the floor is to be sloped to drains. If so, please confirm that the concrete floor is to be sloped and terrazzo floor is to follow slope of concrete.	No drains provided at individual restrooms. Terrazzo will not be sloping.
39	As per 5/A-512 for stair 1, the landing at EL 7'4" has a plywood substrate shown on it beneath the terrazzo. We would require 2 layers of plywood, at 3/4" thick each, tongue and groove, connected to minimize deflection. Please confirm.	5/A-512 shows a steel plate underneath the plywood to minimize deflection. The plywood is meant to be a leveling surface on top of the steel plate. The exact construction may be further reviewed during shop drawing submittals, as required.
40	As per 1/A-512, rivet is shown in center of terrazzo treads. Who is responsible for installing this? What does the rectangular area around the rivet mean?	The rivet is intermittent and shot into the concrete substructure to keep the precast tread from shifting. The area around the rivet to be filled with mortar. Contractor is responsible for providing this, and may subcontract as necessary per means and methods.
41	Please provide specification for the linear slot drain as shown on Drawing P-101 and Drawing A-415.	Refer to updated specification section 221423 Storm Drainage Piping Specialties, included with this Addendum.
42	The specifications call for duct board with ASJ finish on concealed ductwork. Can duct wrap be used in lieu of what is specified?	Yes. For duct insulation schedule, refer to specification section 230713, Art. 3.12 & 3.13. For example, 3.13.E indicates concealed rectangular supply ductwork with option for fiberglass blanket, mineral blanket, fiberglass board, or mineral board as acceptable insulation products.
43	For systems called out to have duct board with PVC jacketing, may we utilize ductboard only?	No. Per specification section 230713, Art. 3.15.D, provide PVC jacket for indoor exposed ductwork and plenums.
44	For rooftop ductwork, can ductboard with Ventureclad be used, in lieu of duct board with aluminum jacketing?	Ventureclad is not acceptable in lieu of aluminum jacketing; provide items as indicated in specification section 230713.
45	Can fiberglass insulation with ASJ finish and PVC fitting covers be used on piping in concealed locations, in lieu of fiberglass insulation with PVC jacketing?	No. Per specification section 230719, Art. 3.18.C, indoor concealed piping is to be provided with 20mm thick PVC.
46	Can fiberglass insulation with PVC jacketing be used for piping in exposed locations, in lieu of Fiberglass insulation with aluminum jacketing?	No. Per specification section 230719, Art. 3.18.D, indoor exposed piping is to be provided with aluminum jacketing.
47	May we utilize flexible elastomeric insulation with aluminum jacketing for exterior refrigerant piping, in lieu of 304 SS jacketing and fitting covers?	No. Per specification section 230719, Art. 3.19.B, stainless steel jacketing and fitting covers is to be used.

48	Please provide a manufacturer and product for the slot drain at street level along the front of the library. See A-415 and P-101.	Refer to updated specification section 221423 Storm Drainage Piping Specialties, included with this Addendum.
49	There is no roof protection plan for the neighboring properties. This will be required to erect the masonry walls which rise above their roof levels. Please advise if these will be provided.	Roof protection plans will not be provided, as the Contractor is responsible for providing these plans as part of own means and methods.
50	There are no scaffold plans for the project, especially for where the masonry walls must be built above the adjacent properties roof levels. Please advise if these will be provided.	Scaffolding plans will not be provided, as the Contractor is responsible for providing these plans as part of own means and methods. Refer to DDC General Conditions, Section 015423, Temporary Scaffolding and Platforms, for further information.
51	Article 2.3.A of specification section 084423 states “Impact Resistant Aluminum Curtain Wall System.” Please advise if windborne-debris impact resistance is required for the exterior curtain wall frames.	Impact resistance is not required. Please see updated section 084423 for updates to Article 2.3.A, included with this Addendum.
52	Please advise if the custom acid etch patterns shown for the interior glazing can be achieved thru a digitally printed design process or a simulated acid etch process.	No. Please follow requirements of section 088000 Glazing for Ceramic-Coated (Frit) Vision Glass.
53	Please advise if the “Spandrel” panel shown at elevation 2/A-601 is to be a full coverage opaque glass or a painted aluminum panel.	Refer to revised drawings A-601, A-635, and A-651, included with this Addendum. The glass type at the spandrel has been noted.
54	Please provide further details on these materials below as to who the supplier/manufacturer should be: - TERR-1: TERRAZZO (BEIGE) - COLOR 1: Honey-Color Terrazzo - TERR-2: TERRAZZO (GREEN) - COLOR 2: Color 2: Green Terrazzo - Stair Count Stair 1 Tread Only (Tread: 12" , Stair Widht: 5'4") - Stair Count Cellar Level (Tread: 11" , Riser: 7" , Stair Widht: 6'11")	Refer to specification section 096623 Resinous Matrix Terrazzo Flooring for this information.
55	Who is responsible to disconnect and remove the wires leading from the utility pole at north side of Austin Street that feeds this building and are not shown on plans? Also, who is responsible to relocate the existing wires leading to the adjacent building that will interfere with the construction of the new building?	Contractor is responsible. See DM-102 for further information.
56	Can the bus station be temporarily relocated?	Contractor is responsible to coordinate this with MTA. See DM-101 for further information.
57	Please advise if MPT plans will be released.	No, MPT plans will not be released. Contractor is responsible to coordinate this with NYC DOT.
58	Please advise if DDC has coordinated with DOT lane closures for storage areas on 63rd Drive and Austin Street.	No, DDC has not coordinated this. Contractor is responsible to coordinate this with NYC DOT.
59	Can the bullnose be made into two separate pieces?	No. Please follow brick shapes as designed.
60	Are core holes acceptable in bullnose shape?	No.

61	What the continuous thermally broken shelf angle system is and where can we find the specification?	See specification section 042000 Unit Masonry, Article 2.4 D and E.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

Revisions to the Drawings:

1. A-601 "SPANDREL PANEL" note revised to "GL-5 WITH SHADOWBOX".
2. A-635 "SPANDREL PANEL" note revised to "GL-5" and "PTD ALUM PANEL".
3. A-641 Detail 10: "1/8" ZINC DIVIDER STRIP" revised to "ALUM DIVIDER STRIP, TYP".
   Detail 11: "1/8" ZINC DIVIDER STRIP" revised to "ALUM DIVIDER STRIP, TYP".
   Detail 14: New detail added.
4. A-651 "SPANDREL PANEL" note revised to "GL-5" and "PTD ALUM PANEL".
5. A-701 "BEIGE" revised to "HONEY" on Finish Legend.
6. M-001 Updated Drawing Index.
7. M-301 Clarified bypass bag filter location and valve trim.
8. M-502 Added bypass bag filter schedule.
9. P-001 Updated drawing index.
10. P-700 Updated flushometer, lavatory faucet, and staff pantry faucet to coordinate with LEED requirements.

Revisions to Volume 3:

Table of Contents:

1. 083323.13 Specification section removed.

Specifications:

1. 083323.13 Specification section removed.
2. 084423 2.3 STRUCTURAL-SEALANT-GLAZED CURTAIN-WALL ASSEMBLIES / A. Product Description: "Impact resistant" removed.
   Nominal face dimension revised from 3" to 2 1/2" to correspond with drawings.
3. 087100 3.9 DOOR HARDWARE SCHEDULE / A. / 21. HW Set: AL S1.0 - Door 101.1
   Operation: Text added: "ADA actuator on exterior to be activated/deactivated by Key Switch/Time Clock/Security."
   Text removed: "After hours, electric strike, request to exit and door contact is activated allowing entry by card reader."
   Text added: "After hours: Key Switch/Timer/Security to engage electric strike and deactivate exterior automatic operator actuator. Entry by mechanic key by authorized

personnel only. Free egress by push bar of panic or Vestibule/Lobby actuator to release electric strike and start automatic door operator."

4. 093013 — 2.3 TILE PRODUCTS / A. Wall Tile / 2. Type CT-2 / c. Previous Bedrossians spec has been discontinued and has been replaced with:
"c. Nemo: Lapis.
1) Color: Travertino.
2) Size: 1 inch x 1 inch."

5. 221423 — 1.2 SUMMARY / A. Section Includes: "2. Trench Drains" added to section.
1.4 ACTION SUBMITTALS / A. Product Data: "2. Trench Drains" added to section.
"2.2 TRENCH DRAINS" section added.
"B. Trench Drains Cleanout Cover" section added under 2.3 CLEANOUTS.

6. 224213.13 — 2.3 FLUSHOMETER VALVE / A. / 1. Basis-of-Design product and comparable products updated to coordinate with LEED requirements.

7. 224216.13 — 2.2 MANUALLY OPERATED LAVATORY FAUCETS / B. / 1. Basis-of-Design product and comparable products updated to coordinate with LEED requirements.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 6 of the procurement.

Please note that numbering of addenda is independent of rounds.

Bid Opening Date Changes:

The Bid Opening scheduled for November 18, 2024 at 2:30pm is rescheduled for December 4, 2024 at 2:30pm.

Questionnaire Changes:

None

Item Grid Changes:

None

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: December 16, 2024; between 11:30am & 2:00pm
BID OPENING DATE/ TIME: December 16, 2024; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24		
#2 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/11/24		
#3 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/16/24		
#4 Revised Bid Opening Date		10/28/24		
#5 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		11/15/24		
#6 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		11/22/24	SZ	NA

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

November 22, 2024

ADDENDUM No. # 6

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **The Bid Opening for the contract described below scheduled for December 4, 2024, at 2:30 pm is rescheduled to December 16, 2024 at 2:30 pm.**

   Contract #1 General Construction

2. **Bidders Questions and Responses to Questions:**
   See Attachment A. (Not Used)

3. **Revisions to Documents:**
   See Attachment B.

4. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled “Transferring Data Between Rounds of an RFX” has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

DDC strongly advises vendors to finalize and submit bids 48 hours prior to due date and time. The City is not responsible for technical issues (e.g. internet connection, power outages, technology malfunction, computer errors, etc.) related to bid submissions.

If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

NOT USED

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

Revisions to Volume 2: Executive Order 39 updates dated 11/19/24

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 7 of the procurement.

Please note that numbering of addenda is independent of rounds.

Bid Opening Date Changes:

The Bid Opening scheduled for December 4, 2024 at 2:30pm is rescheduled for December 16, 2024 at 2:30pm.

Questionnaire Changes:

None

Item Grid Changes:

None

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: January 13, 2025; between 11:30am & 2:00pm
BID OPENING DATE/ TIME: January 13, 2025; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24		
#2 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/11/24		
#3 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/16/24		
#4 Revised Bid Opening Date		10/28/24		
#5 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		11/15/24		
#6 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		11/22/24		
#7 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		12/9/24	SZ	PS

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

December 9, 2024

ADDENDUM No. # 7

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **The Bid Opening for the contract described below scheduled for December 16, 2024, at 2:30 pm is rescheduled to January 13, 2025 at 2:30 pm.**

   Contract #1 General Construction

2. **Bidders Questions and Responses to Questions:**
   See Attachment A.

3. **Revisions to Documents:**
   See Attachment B.

4. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled “Transferring Data Between Rounds of an RFX” has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

DDC strongly advises vendors to finalize and submit bids 48 hours prior to due date and time. The City is not responsible for technical issues (e.g. internet connection, power outages, technology malfunction, computer errors, etc.) related to bid submissions.

If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

No.	Bidders Questions	DDC Responses
1	Confirm that MC Cable is allowed for use in concealed locations.	MC Cable will be permitted in concealed locations. Please see revised specification sections 260519 - Low-Voltage Electrical Power Conductors and Cables and 260533.13 - Conduits for Electrical Systems, included as part of this Addendum.
2	Please provide a specification for the underground raceways shown on plans.	See revision to specification section 260533.13 - Conduits for Electrical Systems, included with this Addendum, for this information.
3	There are underground raceways for the service switches, but there is not an underground raceway specification section (26 05 25). Please clarify raceway type to be used underground.	Underground raceways must be either PVC Schedule 80 or HDPE. Raceways to/from underground penetrating through floor slab must be RGS type. See revision to specification section 260533.13 - Conduits for Electrical Systems, included as part of this Addendum, for clarification.
4	The detention basin as shown on A-413 is a concrete basin, but plumbing specifications call for a steel basin. Please advise which is correct.	Detention tank to be CIP concrete per architectural and structural drawings. Please see updated specification section 221463 – Facility Storm Water Retention Tanks, included with this Addendum.
5	Can you please help with the following details which are missing in the documents for us to price the signs: 1. Pin Mounted Signs (Text - Librarian/ Customer Service) a. Sign Thickness b. Sign font c. Sign Mounting details d. Sign Type - Flat Cut/ Fabricated 2. Vinyl Character Signs a. Drawings/Artwork with sizes b. Specifications and material details 3. The Fore Sign (Plaque) a. Sign Mounting Details b. Sign Process - Digital Printing/ Engraving c. Quantity 4. The Fore Sign (Bristol board sign) a. Sign Mounting Details b. Sign Process - Digital Printing/ Engraving c. Quantity	Refer to SG series drawings included as part of this Addendum for signage details, as well as section 101400 Signage, for specifications.
6	Please provide the BPP plans for the project referenced in the Civil Drawings.	See revised C-series drawings, including the BPP, included as part of this Addendum.

7	Re: the note in the bottom left corner of C-400, should the price to replace the 50' LF of 8" water main be included in our base bid, seeing as there is no alternate, allowance or unit price for this work in the bid?	The price must be provided as part of the base bid. See revised note on C-400, included as part of this Addendum.
8	The plan view drawings show silencers at the Fan Powered Boxes (FPB), but the Equipment Schedules do not list any silencers for the FPBs, only for the VAV Boxes. Please confirm if silencers are required and provide a schedule if applicable.	Silencers are required for the fan powered boxes. Refer to updated M-001, M-100, M-101, M-102, and M-502, included as part of this Addendum.
9	It looks like the railroad tracks to the south are within 200' of the excavations. Due to this, is special railroad insurance or any filings with MTA required for the permit on the project? The insurance requirements currently do not indicate that railroad insurance is needed.	No separate insurance is required; see documentation from LIRR for further information within the Appendix, included as part of this Addendum.
10	Re: detail for openings in Beam Webs V on S-803, please clarify the relation of dimension "X" to that of dimension "B" at the rectangular portion of the detail.	Dimension X is shown specifically on the rectangular openings to show the length of weld that is required beyond the vertical stiffener, calculated per note 2 on Detail V/S-803, whereas B is the length of the rectangular opening.
11	There is a specification section on Triple Duty Valves 232123-5, yet none is shown. Please advise if this is required.	Triple Duty Valves are not required. See updated specification section 232123 - Hydronic Pumps, included as part of this Addendum.
12	According to the plans, there is a 1' border around the carpeting. However, there is no detail explaining what this is. Please clarify this border.	See response provided in Addendum 5, Question 24, for clarification.
13	Please advise if the Library will provide the AV equipment listed. The specifications are vague and should include a make and model number of all equipment to be provided by the General Contractor as a basis of design.	The AV specifications include manufacturers, but are written as performance specifications, requiring the Contractor to furnish and install all equipment required for a fully functioning audiovisual system within each space noted on the drawings. The Contractor must submit a fully engineered system as part of the project's shop drawing process: this includes the make and model number of all equipment to be provided.
14	Are the network switches listed in specification 274116 being supplied and installed by the owner?	Network switches specific to the audiovisual systems are considered audiovisual components and are to be provided by the Contractor. Note that this is a separate item from general network switches which are by the Library's IT management team.
15	Please clarify the owner's phone system, as this is needed for paging system coordination. Is this an IP system?	Yes, the phone system is by owner. For bidding purposes, assume it is an IP system.
16	Does the Contractor pay for all DOB permits required on this project?	Yes. The Contractor is responsible for pulling permits.

17	Section 064216 Flush Wood Paneling, Article 2.4 D.1 notes “Made to order, sequence matched panels within each sperate area.” However, matching the veneers on the door leaves will not be possible. Please confirm if veneer on doors is required to match millwork panels? Will there be a veneer millwork panel overclad for wood doors to match? If so, what will be the thickness of the veneer overclad? If no veneer overclad will be provided, we can only book match a series of up to 4 doors in the same opening. It’s not possible to provide matching veneer for a series of doors greater than 4 as per Masonite. For instance, at Doors (C01, C03.2, C03.1, & C02) we will only be able to book match 4 doors at the same opening. Please advise.	The veneer of the door itself is required to match its adjacent millwork veneer per the specifications. It will not be overclad. Achieving this is per the Contractor’s own means and methods.
18	Can the contractor receive a copy of the sign in sheet from the 10/2 walk through?	Yes. Refer to Pre-Bid Walkthrough Sign in Sheet, included with this Addendum.
19	Are we to carry in our bid the $15,000 allowance in section 028013 Incidental Asbestos Abatement and the cost for the scope of abatement in section 028213 Asbestos Abatement?	Yes, both costs are to be included as part of the Bid.
20	On Drawing E-400, please clarify the Con Ed scope of work for the incoming service. Who will be responsible for the incoming conduit and service wire into the 1200A Service: will it be the utility or Contractor’s responsibility?	Contractor is to provide conduit stub penetration through building exterior at property line. Con Ed will provide wiring terminated to service end box. The service endbox for this project will be located directly above the Con Ed CT cabinet.
21	On Drawing E-400, please specify the feeders (wire & conduit) that we are to provide from the 1200A Service to each ASCO Transfer Switch.	Emergency and normal side feeders at service switch #1 and service switch #2 must match its emergency feeder, as shown per EDP panel schedule on Drawing E-501.
22	Clarification is needed concerning the timing of the project. The RX lists the project as anticipated start of 3/14/25; will there be any administrative work allowed to be performed prior to that anticipated date, where NTP is issued but a no access period will apply? Or, will the NTP be the anticipated start date in March?	NTP is the start date for the project. As such, administrative work starts at NTP. The only thing Contractors can start before NTP is preparation of the site safety plan, which they are allowed to start at notice of intent to award.
23	The Bid Form is indicating the Unit Price for Temporary Heat is based on a per month basis over 30 months. Generally Temporary Heat is formulated on a Season Basis. Would it be possible to change the Unit to a single Season?	Contractor will be paid only for the months that temporary heat is provided. Refer to DDC General Conditions Section 015000 Article 3.5.K for further information.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

Revisions to the Drawings:

1.	G-001	SG drawing series added to sheet list. BPP Drawing series added to sheet list.
2.	C-001	Total sheet count in title block revised.
3.	C-100	Total sheet count in title block revised.
4.	C-150	Total sheet count in title block revised.
5.	C-200	Total sheet count in title block revised.
6.	C-300	Total sheet count in title block revised.
7.	C-400	Total sheet count in title block revised. Note 1 revised to remove reference to “alternate”.
8.	BPP-001	Sheet added to set.
9.	BPP-101	Sheet added to set.
10.	BPP-102	Sheet added to set.
11.	BPP-201	Sheet added to set.
12.	BPP-202	Sheet added to set.
13.	BPP-301	Sheet added to set.
14.	SG-series	Signage drawing series added to set.
15.	M-001	Updated drawing index.
16.	M-100	Updated VAV silencer dimensions.
17.	M-101	Updated VAV silencer dimensions.
18.	M-102	Updated VAV silencer dimensions.
19.	M-502	Added fan powered finned tube data into sound trap schedule.

Revisions to Volume 3:

Table of Contents:
1. LIRR LETTER OF NO EXCEPTION (LON 22-169) added to Appendix.
2. LIRR LETTER OF NO EXCEPTION (LON 22-092) added to Appendix.
3. PRE-BID WALKTHROUGH SIGN IN SHEET added to Appendix.

Addendum to the General Conditions:
1. Schedule C updated to add new Drawings

Specifications:

1.	221463	1.2 SUMMARY / A. / 1. revised to “Concrete, Storm-Water Retention Tanks” 1.6 QUALITY ASSURANCE / B. / subsections 4-8 added to list. 2.1 CONCRETE, STORM-WATER RETENTION TANKS section revised.
2.	232123	2.5 PUMP SPECIALTY FITTINGS / B. Triple-Duty Valve section removed.

3.	260519	1.2 SUMMARY / A. Section Includes: / “3. Armored Cable, Type AC.” removed. 1.4 ACTION SUBMITTALS / A. Product Data / “3. Armored Cable, Type AC.” removed. “2.3 ARMOVED CABLE, TYPE AC” section removed. 3.3 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS / “E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.” revised to “E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal clad cable, Type MC.”
4.	260533.13	1.2 SUMMARY / A. Section Includes: “3. Type HDPE and Type EPEC duct raceways and fittings.” added to section. 1.5 ACTION SUBMITTALS / A. Product Data: “3. Type HDPE and Type EPEC duct raceways and fittings.” added to section. 1.6 INFORMATIONAL SUBMITTALS / A. Manufacturers’ Published Instructions: “3. Type HDPE and Type EPEC duct raceways and fittings.” added to section. 2.3 TYPE HDPE AND TYPE EPEC DUCT RACEWAYS AND FITTINGS new section added. 2.7 TYPE PVC DUCT RACEWAYS AND FITTINGS / D. / 3. Options section updated. 3.2 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS / C. formatting of section revised. 3.2 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS / D. / Item added: “Use MC type copper cable for lighting and power circuits in concealed locations.” 3.2 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS / “F. Underground:” new section added. 3.3 INSTALLATION OF CONDUITS FOR ELECTRICAL SYSTEMS / B. / “4. Type HDPE and Type EPEC: Article 353 of NFPA 70 and NECA NEIS 111.” new line item added.

Revisions to the Appendix:

1. LIRR LETTER OF NO EXCEPTION (LON 22-169) added.
2. LIRR LETTER OF NO EXCEPTION (LON 22-092) added.
3. PRE-BID WALKTHROUGH SIGN IN SHEET added.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Library: New Facility**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 8 of the procurement.

Please note that numbering of addenda is independent of rounds.

Bid Opening Date Changes:

The Bid Opening scheduled for December 16, 2024 at 2:30pm is rescheduled for January 13, 2025 at 2:30pm.

Questionnaire Changes:

None

Item Grid Changes:

None

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

ADDENDA CONTROL SHEET

BID SUBMISSION DATE/ TIME: January 13, 2025; between 11:30am & 2:00pm
BID OPENING DATE/ TIME: January 13, 2025; 2:30pm

PROJECT No. : **LQQ122-RG**

TITLE: **Rego Park Library: New Facility**

ADDENDA ISSUED	NO. OF DWG	DATE	APPROVED BY: ARCHITECTURE/ ENGINEERING	GENERAL COUNSEL
#1 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		9/16/24		
#2 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/11/24		
#3 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		10/16/24		
#4 Revised Bid Opening Date		10/28/24		
#5 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		11/15/24		
#6 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		11/22/24		
#7 Revised Bid Opening Date; Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		12/9/24		
#8 Questions from Bidders and Responses to Questions; Revisions to Documents; Revisions to PASSPort Forms		12/27/24	BB	PS

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

December 27, 2024

ADDENDUM No. # 8

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

85025B0014– LQQ122-RG

Rego Park Library: New Facility

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **Bidders Questions and Responses to Questions:**
   See Attachment A.

3. **Revisions to Documents:**
   See Attachment B.

4. **Revisions to PASSPort forms:**
   See Attachment C.

Transferring Data Between Rounds of an RFX: A new document titled "Transferring Data Between Rounds of an RFX" has been added to the Documents section of the View RFx tab. Please refer to this document when an addendum has been issued. Note: Whenever an addendum is issued, the RFX item grid will be cleared. You can import the work you have already done by following the steps on this document.

DDC strongly advises vendors to finalize and submit bids 48 hours prior to due date and time. The City is not responsible for technical issues (e.g. internet connection, power outages, technology malfunction, computer errors, etc.) related to bid submissions.

If additional information is required, please contact the Department of Design and Construction, Contract Section via PASSPort (in the Discussions with Buyer section).

Sarah Zomick for

Richard Jones, PE CWI CDT
Chief Engineer

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Community Library**

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

No.	Bidders Questions	DDC Responses
1	Please provide preferred Fire Alarm and BMS Vendor information to be used in base bid.	Please see revised specification sections 284621.11 - ADDRESSABLE FIRE-ALARM SYSTEMS and 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC.
2	There are a lot of discrepancies with the Fire Alarm drawings and the specs that they don't match up. Please advise. At a glance, the specs are calling for features listed below: • Fan Run, Start, Stop Control and Monitoring • BACKNET • 5 year Warranty • Post Fire Smoke Purge • Graphic Annunciator • See Page 2177 Section C – Fire Alarm Signal must initiate the following: Long List of Items • Hose Cabinet Monitoring • Voice System – Plans show Horn Strobes • Printer • Fire Fighter Smoke Control System	See revised specification 284621.11 Addressable Fire-Alarm Systems included as part of this Addendum. Specific comments below: • Fan Run, Start, Stop Control and Monitoring – Required for the post fire smoke purge system. Refer to revised 2.10 section for more details. • BACKNET – BACnet interface is required between fire alarm system and building automation system as per section 2.1 (B) (2) (g) (3). • 5 year Warranty – Warranty period is required as per section 1.11. • Post Fire Smoke Purge – Refer to revised 2.10 section for more details. • Graphic Annunciator – Not required, section has been deleted from specification. • See Page 2177 Section C – Section has been revised to clarify the sequence of operations. • Hose Cabinet Monitoring – Monitoring required as per section 2.1 (B) (2) (g) (3). • Voice System – Specification has been revised to remove any references to voice system; only horns only. • Printer – Provide printer at fire alarm control unit as per specifications. • Fire Fighter Smoke Control System - There is no active smoke control system on the project, only post fire smoke purge system. Refer to revised 2.10 section for more details.
3	Door C06 as per the door elevations provided has a stile width of 3 1/2". Due to the manufacturer's recommendations in the place of a lite and electrified mortise lock the stile would need to be at least 6 1/2" or more. See attached for more information. Please verify these dimensions.	Please see revised drawings A-602, A-652, A-653, and A-702 included as part of this Addendum. Door stile has been updated to 6 ½".
4	Please provide drawings to existing building to be demolished in order to price accurately, we will need to know slab thickness, locations and sizes of footings, foundations. Sizes of structural steel. Locations of underground utilities, vaults, etc.	Please refer to DM-101, DM-201, and DM-201 for known demolition scope.
5	Please advise if there are licensing agreements in place with the neighboring properties for the work that occurs against their building and the masonry walls, which are to be installed above their roof level.	Licensing agreements are currently being negotiated with the neighboring properties

6	Additional information is needed concerning the foundation support at the adjacent property on 63rd Drive where the rear foundation wall of that property is higher than guide wall to install secant piles. Please provide clarification if the design engineer of record will issue a design of support of the adjacent structure by way of underpinning or comparable method. We request a foundation wall section be taken at that location as current section do not show this condition.	Refer to General Note 2 on FO-600.00 for delineation of responsibilities. The EOR for the permanent secant wall has no role in the design or detailing of the contractor's means and methods including but not limited to any SOE, underpinning, and/or methods of shoring or bracing necessary to facilitate excavation and construction of any permanent foundation elements. The contractor and his professional engineer are responsible for such and shall perform the necessary investigation required to detail such and amend their means and methods as required to facilitate the required work.
7	Will the total bid value read publicly, at the bid opening, include the total of the unit prices?	Yes, the total bid will be read publicly. The unit price amount will not be read separately.
8	Will the final determination of the low bidder, to whom DDC intends to award the contract, included the costs of the unit prices?	Yes.
9	In Accordance with addenda #1 specification, section 015411 sub-section 3.1 (A-J) applies to this project. Paragraph D indicates this temporary elevator is to be located at same location of the main elevator, and further alludes to that it cannot be removed until main elevator is in proper condition for service per Paragraph F. There is a conflict in providing a temp elevator in the same location as the permanent. as there is only a single elevator on this project. Please clarify if a temporary elevator is required.	This does not apply. See attached updated Addendum to General Conditions.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Community Library**

ATTACHMENT B – REVISIONS TO THE DOCUMENTS

Revisions to the Drawings:

A-602 Details 4 and 10: Door stile width increased graphically.

A-652 Detail 5: Door stile width increased to 6 ½".

A-653 Detail 3: Door stile width increased to 6 ½".

A-702 Door C06: Door Type and Detail callout numbers revised.
Door C10: Door Hardware type revised.
Door C18: Door Hardware type revised.
Door 109: Door Hardware type revised.
Door 110: Door Hardware type revised.
Door 210: Door Hardware type revised.
Detail 1: Door Type E added.

Revisions to Volume 3:

Revisions to the Addendum to the General Conditions:

p.4: 015411, 3.1(A-J): marked as 'Does Not Apply.'

Revisions to the Specifications:

087100 3.9 DOOR HARDWARE SCHEDULE / A. / 1. HW Set: 1.0 updated to "NOT USED".
3.9 DOOR HARDWARE SCHEDULE / A. / 1. HW Set: 1.1 updated to "Doors C09, C10, C18, C20, C22, C23, C24, 109, 110, 210" to conform with LEED requirements.

230923 2.1 DIRECT DIGITAL CONTROL SYSTEM MANUFACTURERS / A. / Updated Direct Digital Control System spec to Sole Source Manufacturer.

284621.11 1.6 ACTION SUBMITTALS / C. / 13. / a. Updated to: "… and override by post fire smoke purge system."
2.1 ADDRESSABLE FIRE-ALARM SYSTEM / B. / c.
1) Removed: "including voice evacuation notices."
8) Removed line item.
9) Edited "elevator-shaft pressurization systems" to "elevator shaft ventilation".
11) Removed line item.
15) Removed "such as emergency generators and fire pumps."
2.1 ADDRESSABLE FIRE-ALARM SYSTEM / B. / f. 6) Line item removed.
2.2 FIRE ALARM CONTROL UNIT (FACU) / A. Updated specification to Sole Source Manufacturer.
2.3 MANUAL FIRE-ALARM BOXES / A. Updated specification to Sole Source Manufacturer.
2.4 SYSTEM SMOKE DETECTORS / A. Photovoltaic Smoke Detectors / 1. Updated specification to Sole Source Manufacturer.

2.4 SYSTEM SMOKE DETECTORS / B. Ionization Smoke Detectors / 1. Updated specification to Sole Source Manufacturer.
2.5 DUCT SMOKE DETECTORS / A. Updated specification to Sole Source Manufacturer.
2.6 CARBON MONOXIDE DETECTORS / A. Updated specification to Sole Source Manufacturer.
2.7 HEAT DETECTORS / A. Combination-Type Heat Detectors / 1. Updated specification to Sole Source Manufacturer.
2.7 HEAT DETECTORS / B. Fixed-Temperature-Type Heat Detectors / 1. Updated specification to Sole Source Manufacturer.
2.8 MULTICRITERIA AND MULTISENSOR FIRE DETECTORS / A. Updated specification to Sole Source Manufacturer.
2.9 FIRE-ALARM NOTIFICATION APPLIANCES / A. Fire-Alarm Audible Notification Appliances / 1. Updated specification to Sole Source Manufacturer.
2.9 FIRE-ALARM NOTIFICATION APPLIANCES / B. Fire-Alarm Voice/Tone Notification Appliances / 1. Updated specification to Sole Source Manufacturer.
2.9 FIRE-ALARM NOTIFICATION APPLIANCES / C. Fire-Alarm Visible Notification Appliances / 1. Updated specification to Sole Source Manufacturer per DDC request.
2.10 entire section revised.
2.11 FIRE-ALARM GRAPHIC ANNUNCIATORS entire section removed.
2.12 FIRE-ALARM REMOTE ANNUNCIATORS / A. Updated specification to Sole Source Manufacturer.
2.13 FIRE-ALARM ADDRESSABLE INTERFACE DEVICES / A. Updated specification to Sole Source Manufacturer.
2.14 DIGITAL ALARM COMMUNICATOR TRANSMITTERS (DACTs) / A. Updated specification to Sole Source Manufacturer.

DDC PROJECT #: **LQQ122-RG**

PROJECT NAME: **Rego Park Community Library**

ATTACHMENT C – REVISIONS TO PASSPORT FORMS

This Addendum initiates Round 9 of the procurement.

Please note that numbering of addenda is independent of rounds.

Questionnaire Changes:

Added NYSDOL Public Work Contractor and Subcontractor Registry requirements.

Item Grid Changes:

None

FMS ID: **LQQ122-RG**

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF PUBLIC BUILDINGS

30-30 THOMSON AVENUE LONG ISLAND CITY, NEW YORK 11101-3045
TELEPHONE (718) 391-1000 WEBSITE www.nyc.gov/ddc

Department of Design and Construction

Contract for Furnishing all Labor and Material Necessary and Required for:

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

Rego Park Library: New Facility

LOCATION: **91-41 63rd Drive**
BOROUGH: **Queens, NY 11374**
CITY OF NEW YORK

Contractor

Dated _____ , 20 _____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____ , 20 _____